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EDITORIAL NOTES.

The Rating of Urban Building Sites.

ON Wednesday last, the House of Commons was not unprofitably engaged in discussing the Urban Site Value Rating Bill, which was very creditably rejected by a substantial majority. The promotion of the Bill was a flagrant example of the dangers to which some of the greatest industrial and other interests of the country are continually exposed by the private member of Parliament, who is, for his part, usually inclined to regard himself as a meritorious person upon whose projects of legislation the Fates too harshly frown. A pretty state of affairs we should have in England, if the ways of private members' legislative schemes were easier! The particular Bill in question purported to be an attempt to give effect to the recommendations of the Separate Report on Urban Rating and Site Values by Lord Balfour of Burleigh and four of his colleagues of the Royal Commission on Local Taxation. It aimed at establishing a special site-value rate, to be levied alongside of existing rates in all populous town districts. The rate was to be assessed on the annual value of all land, whether occupied or not, as distinct from the value of any buildings erected on the land. The whole rate was to be charged generally in the first instance on present ratepayers. Special provision was made for divided buildings and unoccupied land. The total amount of the new rate was to be limited to 2s. in the pound on the "site value," which term, according to the Bill, would mean the annual sum at which the surface of the land might be expected to let clear of the buildings, if any, actually upon it.

It will be perceived that the Bill was an attempt to bring in sideways the much-discussed principle of the taxation of ground-rents; and the avowed objects of its advocates were decidedly mixed. They wanted to increase the revenues of local authorities, to reduce the sums paid by existing ratepayers, to force landowners to let their land for building purposes, to catch the "unearned increment," and several other things. Chiefly, their idea was that the Bill would find some great source of wealth which is at the present time untapped. That is, of course, a *desideratum*. It is agreed on all sides, that local taxation in the United Kingdom has already become as heavy as can be fairly borne by the single form of ability to pay which is loaded with it. If there is another form of property, fairly chargeable for the expenses of local government, and as yet untaxed, then most people would agree that it ought to be got at somehow, and that no initial difficulties in the shape of valuation should be permitted to bar the way. We, at any rate, have so much faith in the ingenuity of contemporary valuers for assessment purposes, that we would trust them to find the proper figure for such a hereditament as a prophet's mantle, if the Courts decided that it ought to bear rates.

But the now happily defunct Bill would have given the valuers a few tough puzzles, all the same. It asked them, in the simplest cases, to ascertain what might be the value of a piece of land, assuming it was not put to its actual use, but to something different. That is no easy question to answer; and it is very evident that it would work out in opposite ways with different classes of property. The attraction of all such projects for Land Nationalizers and Socialists—and the description would apply to some backers of the Bill—is that they propose to catch the ground landlord, and make him disgorge some of his unearned gains for the benefit of the poor residents of the locality. Unfortunately for this amiable desire, it is not at all clear that the ground landlord is free to be caught, or that he is fair game. The exact truth about the incidence of taxation is never very easy to get at. Opinions, even of those who rank high as authorities on economics, differ widely as to who eventually pays taxes; but it is pretty generally held that the consumer of the taxed article usually gets the heavy end of the stick. It savours, therefore, of hypocrisy to offer to put another rate on a commodity used by him, with the object of lightening his burdens.

Of course, a plan of campaign like this would devastate such extensive, unrepresented landowners as gas companies, railway companies, and all similar orders of proprietors. Whatever is or is not done to reform the national system of local taxation, there is at least one scandal of the existing arrangement which will have to be redressed before long. We allude to the divorce of payment of taxes from representation on the taxing authority which these cases present. As it is, the persons who make and spend the rates are not, as the theory supposes, the same as those who pay the money. In some local government districts the difference is ludicrously conspicuous—as in the example of the Walker and Wallsend district of Tyneside. One can well imagine the case of a great industrial company owning all the land and buildings and paying all the rates of a parish, while not possessing directly a single vote, or having the right to say a word in respect of local expenditure. That is one of the anomalies of the existing system which ought not to be allowed to endure indefinitely.

The Coal Market.

GAS managers are everywhere keeping an eye on the coal market barometer; and those who are studying it most closely will agree with us that the outlook is distinctly favourable—that is to say, prices are moving down rather than up. There is, however, room for a considerably greater fall; and we do not think that the gas industry should be in any hurry to accept the present level as a basis for ensuing contracts. According to market reports, sales of gas coal for foreign consumption have been made during the past few days at prices equal to about 8s. 6d. a ton f.o.b. Tyne, or 6d. a ton under the price at which the London Companies made their contracts last year; and these Companies are not likely to look with a favourable eye upon so small a reduction. The correspondents of the coal-trade papers—who, naturally, are the last to announce any depression in the market—are decidedly pessimistic in their latest reports, which show that buyers generally are, very wisely, biding their time. A Durham correspondent summarizes the outlook as follows:—

> No doubt whatever remains as to the reality of the slump that has overtaken trade—in coals, at any rate. There were merchants and others who had sufficient optimism to expect a recovery during the current month. But everything points to a contrary movement in business; and the conviction is pretty general that the remainder of the year's business will have to be arranged on a very low basis. . . . The Durham gas coal trade is barely kept going by contract shipments; and a plentiful supply is offering upon the market. . . . Forward inquiries are better; but actual business is backward—evidently from an anticipation of easier rates.

This affords sufficient support to our constantly repeated advice to the gas industry—to be in no hurry to make forward contracts except upon favourable terms—to relieve any gas manager of nervousness as to playing a waiting game.

The great difficulty in the way of the coalowners offering material concessions is the wages question. The decreases that have taken place in the rates of wages payable in the different coalfields have not been, except in Scotland, at all commensurate with the decline in the prices of coal. In the Federation area, no reduction whatever has been made, and the masters appear to be very nervous of opening the question, which must, however, be faced in the near future. The maximum rate has been paid in the Federation districts for over a year, during the whole of which period prices have been on the down-grade, so that the men have had their full share of the prosperity enjoyed by the industry in recent times. In Northumberland and Durham, the miners have only lost half, and in Wales only a sixth, of the increase they obtained during the time of rising prices, although prices have come down much more than half way towards the level from which they rose.

This is the lion in the path of the coalowners. But the difficulty has to be got over sooner or later; and there is no reason why gas coal buyers should assist in the postponement of the arduous—let us hope it need not be described as the "evil"—day, by not pressing for the full abatement of prices warranted by market conditions. These conditions are not very likely, we think, to be affected by the slight

improvement discernible in the iron trade—an improvement due to the extraordinary activity of business in the States, and to the easing-off of the pressure from Germany and Belgium, which was rendered very acute by the necessity of makers in those countries unloading their stocks of iron at a sacrifice. There is nothing approaching a "revival" in the iron trade to be seen at present, or to be anticipated in the near future.

Continental Testimonial for Inclines.

Elsewhere in this issue we have pleasure in publishing a communication received from Mr. Edward Drory, the Chief Engineer of the Berlin works of the Imperial Continental Gas Association, respecting inclined and horizontal retort working in the stations under his charge. We have recently been taken to task in a friendly way for a modest little sentence that appeared in an article in the "Journal;" and, callous though we may be thought, we are not sorry those words were written if they had any influence in drawing from Mr. Drory his present instructive contribution to a subject which is uppermost in the minds of gas engineers to-day. If, in this country, gas engineers do not know so much as they ought to know, or rather would like to know, of current gas practice on the Continent, it is not our fault. Every opportunity is taken to obtain careful translations of all important technical contributions to the gas literature of the Continent; but, for the most part, they are scientific dissertations on matters which, though valuable, do not afford much light on actual Continental engineering movements. Excepting the new works at Vienna and Zurich, where in late years have English engineers had the pleasure of having, from other parts abroad, full descriptive accounts of new work, or of results achieved in such detail as we welcome from Mr. Drory this week? However, the Continent is wide; and other Continental friends may see their way to follow a good example, and so bring to our columns still more enlightenment as to what is happening in gas engineering across the North Sea and the Channel.

As already declared, Mr. Drory's contribution is very acceptable; and for the especial reason that it touches the precise spot upon which the most poignant dissension exists in regard to inclined retorts in this country. Let us stay for a moment to point out that there is a little confusion in Mr. Drory's opening paragraph. The discussion and disagreement over the virtue of the inclined system as an economical agent in coal carbonization in comparison with other systems, have nothing whatever to do with the almost generally accepted notions in this country as to what is proper in regard to the structural features of the system. There are differences of opinion in the latter respect; but they are of no more importance than can be set upon a division of ideas as to, for example, the relative advantages of continuous and divided hoppers and the competing methods of charging. So far as we know, in all cases but one, the gas engineers who have installed inclined retorts are of common mind as to the superiority of the system over others; but we cannot go so far as Mr. Drory and say that in England, as "in Germany, Austria-Hungary, Switzer-" land, &c., nobody any longer questions the superiority of " the inclined system over any other."

It is for this reason that we hail Mr. Drory's communication and figures as of no small value. They relate to five variations in the systems of carbonization; and few engineers are so circumstanced that, from within their own walls and from such similarity of conditions, they can produce such exactly comparable data. The facts are all set forth so clearly that we will not draw from the statement a single figure. A considerable saving is shown in favour of inclined retorts as compared with horizontal retorts machine or hand charged; and the greatest economy is revealed when, as at Mariendorf, the inclined retort-house is specially built for the system, and completely furnished with coal and coke handling plant. We suggest to Mr. Drory that he would add immensely to the indebtedness to him of his English colleagues if he would forward for publication a description and drawings of the Mariendorf retort-house and installation.

Explosive Labour Politics.

It is now some weeks since we had any mention in these columns of Labour politics. The truth of the matter appears to be that, so far as the United Kingdom is concerned, the infection of Communistic or Anarchist ideas has only taken very lightly. It may have surprised some patriotic people, originally well disposed towards the "principle" of Trade Unionism, to observe that, with scarcely an exception, the professional fuglemen of our modern Trade Unions are pro-Boers. They had a meeting in Birmingham last week, from which it was found impossible to keep out approving mention of the uncaught De Wet, though what this had to do with the ostensible business of the meeting it would be difficult to say. These things are indications of the way the wind blows. In the case of our Tim Tappertits there is not the remotest likelihood of their tinsel treason taking them into the streets in active revolt "agin' the Government." While there are comfortable club-rooms, with a bar handy, one knows where they are likely to be found. Besides, the British Constitution is a swinging door which yields at a touch of anybody with a substantial grievance; and there is positively no excuse for trying to do anything outside of it. But circumstances are altogether different on the Continent; and it was extremely grave news that came last week from Trieste and Barcelona. In both of these centres of trade, carried on under systems of government which are very different from ours, a general strike of work-people developed into something very like an armed revolt against the established rule and rulers. At the moment of writing, Barcelona seems to be the more desperate case; and the strike is reported to be spreading. The strikers have not hesitated to murder those who resisted them, if only by continuing to work. It was reported that the Barcelona Gas-Works were attacked by the strikers, who were repulsed. Owing to the meagreness of the news allowed to be sent out of the town, it is impossible to say if the supply of gas is still being maintained. An ugly statement was sent to "The Times," that "the strikers are receiving large sums "of money from London." Who is supplying this money, if the report is authentic; and for what purpose?

Those wise people who study the signs of the times will be well advised to read with reserve of judgment the usual kind of newspaper reports of these outbreaks. One may be very sure that they mean something much more serious than the ordinary newspaper correspondent, with his mind full of what the petty politicians say, is likely to perceive. If Social Democrats and their Trade Union colleagues are unpatriotic in England, what are they likely to be in Spain and in Austria? Whenever the Continental workman feels himself overtaxed, believes himself to be oppressed, and concludes that this is all the share he has in the Government, which, on the other hand, means a mass of officials who live on his earnings, is not his Socialism likely to break out into the acute stage at any moment? This is the true inwardness of the strikes at Trieste and in Barcelona, which may be paralleled to-morrow at Genoa, Marseilles, or Naples. Socialism, which with us is a subject of discussion by men in club-rooms and bar-parlours, is bread-and-butter politics with working men who are taxed as Frenchmen, Italians, and Spaniards are taxed. Is it to be wondered at that the victims of this taxation ask themselves what they receive in return for it? The most immediate remedy is emigration. Only recently another line of emigrant vessels between Mediterranean ports and the United States was started. There is plenty of work for them. The Austrians and Italians and Catalans leave their over-governed countries and go to make steel, and mine coal, and work coke-ovens in Pennsylvania. If any English money is going to the centre of industrial disturbance, it might be employed less objectionably in helping this movement than in other ways.

The Paris Gas Question—Meeting of the Company.

The very interesting negotiations regarding the resettlement of the Paris gas supply were carried a stage further last Saturday, when a special general meeting of the Gas Company was called, to receive and consider the official communication of the result of the deliberations of the Municipal Council already recorded in our columns. It has been explained that the favoured scheme for replacing the existing settlement, which expires at the end of 1905, is that identified with the name of M. Spronck, which is the proposal of M. Chamon and others, and has received the support of the Comptoir d'Escompte, and also of the Board of the Gas Company. This scheme provides for the reduction of the price of gas as from the beginning of the present year; for the adjustment of the questions reserved between the Company and the City as regards the winding-up of the existing concession; for the organization of a transition system and

the creation of a joint-interest establishment as from Jan. 1, 1906; and for the eventual division of profits with the employees and consumers. The necessary funds for carrying out this proposed liquidation of the existing Company and immediate reduction of the price of gas, are to be found by a new Company, to be formed with a share capital of £4,000,000 sterling. The controlling fact of the situation thus revealed is that the new Company are to have the right to charge 4s. 6d. per 1000 cubic feet for gas during the ensuing 54 years, in return for the reduction of the price from 6s. 9d. to 4s. 6d. for the next three years.

Opinions differ as to the course the proprietors of the Company should follow in the circumstances; but there cannot be much doubt of the wisdom of closing with the offer now made on behalf of the city. The Company are never likely to get better terms, especially as the shareholders are to be let into the new Company "on the ground "floor," to the extent of one-third of the stock issue. At the same time, there are some sticklers for the abstract rights of parties who argue that to compromise would be a mistake, and that the Company need not fear the consequences of abiding by their Treaty to the bitter end. Meanwhile, it must not be lost sight of that perhaps the most important party to the transaction, M. le Préfet de la Seine himself, has to be reckoned with. The vote of the shareholders on Saturday is not binding upon him. He has already declared his disagreement with the Spronck settlement, and his preference for the course set out in the report of M. Lauriol, which we published on Jan. 7. This alternative project, which is quite within the rights of the superior authority to carry into effect, would be altogether outside the interests represented by the existing Company. Hitherto, the Prefect has ostentatiously reserved his last word on the subject; and nobody knows what this will be. In case the shareholders of the Company reject the proposed settlement, however, the Prefect is invited by the Municipality to proceed on his own plan. We have now received the full text of the projected concession to the new Company, which we shall hold over until it can be seen what action in the matter will be taken by the supreme authorities.

The Maintenance of Welsbach Lights.

We rejoice at the numerous testimonials that come to hand as to the progress of Welsbach burner maintenance in the hands of gas companies. It has been a dead-lift on our part to place this expedient in the position it now occupies, as the only way of enabling English gas consumers to derive the benefit which they are entitled to receive from this means of using gas for lighting purposes with the greatest brilliancy and the highest economy. There is a considerable amount of variety and independence among the different schemes of maintenance practised by English gas companies, and this is good; for a cast-iron uniformity in such matters is foreign to the national spirit. The great thing to be remembered by those gas companies who are even now trembling on the verge of a maintenance scheme, is that the ironmongers and the "trade" have had their innings, and have no right to complain when the work of popularizing incandescent gas lighting is taken out of their inefficient hands. How lax the "trade" has been in this matter is clearly indicated by the fact that the issue of the "Ironmonger" for the 15th inst. contains a letter, possibly from a tradesman of that ilk, suggesting to ironmongers generally that they really might think about trying the maintenance device on their own account! Five years too late! This is the British shopkeeper at his very worst and weakest. Next, it is to be expected our ironmongering contemporary will protest against the unfair and unwarrantable competition of gas companies in taking from the deserving ironmonger another trade, like that in gas cooking-stoves, which he never had.

The Gas-Stove in the Cottage.

It is with very great pleasure that we hear of the sensible ideas entertained by the Hornsey District Council with regard to the requirements of the humbler classes of the population for whom they have undertaken to provide decent house accommodation. It appears that the Council decided to build two classes of self-contained cottages on a site of 4½ acres near the Alexandra Palace. The financial and other details of the scheme are not for us to discuss; but the one point of the excellent planning of these cottages that immediately struck us is the indication of the gas-stove and bath in the scullery. There is no mistake about it—the gas-stove is shown in the plan in its proper place; and the fixed bath is not far off, being cleverly arranged to be worked as part of the ordinary "copper" fitting. It is a good sign that the Hornsey District Council and their Surveyor, Mr. E. J. Lovegrove, recognize the important part played by the gas-stove in the domestic economy of the working-class population. It is one of the signs of a respectable home. Unfortunately, in the planning of many small houses, the placing of the gas-stove has not been thought of, with the result that sometimes it cannot be conveniently fixed at all. The truth is that only recently architects have even taken the trouble to mark the place of the bed in their bedrooms. We saw the other day, in an architectural periodical, a particular architect praised for always taking care to show where the beds should go in his houses; thus ensuring that all the doors should open conveniently and the fireplaces and windows not be too out-of-the-way. So, with the workman's cottage, to mark the place of the gas-stove is at once an acknowledgment of the value of the fitting itself, and a piece of thoroughness on the part of the planner which will go far to ensure the success of his work. It is not surprising to hear that there have been twelve applicants for every vacancy on this Hornsey estate.

The "Chemical Trade Journal" on Fuel Gas.

Under the somewhat cryptic title "The Ounce of Practice," our contemporary, the "Chemical Trade Journal," has essayed to reply to our recent criticism on the crudity of its notions respecting the fuel uses of coal gas, and the price thereof. It now undertakes to justify its assertion that the supply in towns of a native, uncarburetted coal gas, could be done for fuel purposes remuneratively at prices which, in comparison with those ruling at present, would be extremely low. It does this by stating that such a gas costs in the holder about 8d. per 1000 cubic feet, "and that excessive "distributing charges largely make up the difference between "this amount and that which the consumer has to pay." It concludes, therefore, "that as the gas consumption increases "and extends to all hours of the twenty-four, so these dis-"tributing charges would be reduced to their minimum, "and the price to be paid by the consumer more nearly "approximate to the actual cost of production; and it does "not require a very vivid imagination to see that this would "mean an immense decrease of the present figures." We agree that no imagination at all is needed to enable anyone who desires it to see through this matter. Our contemporary is too imaginative as it is. What it wants is a little more acquaintance with the cold facts.

A bare glance at "Field's Analysis" would have checked these imaginings in the bud. The actual cost of Manchester gas in 1891 was: For coal (less residuals), 9·13d. per 1000 cubic feet sold; manufacturing charges, 7·38d. per 1000 cubic feet; distribution charges, 1·73d. per 1000 cubic feet sold. How the abolition of these "excessive" distributing charges would really affect the issue does not appear on the surface. The charge for net coal and working expenses at Manchester last year ran to 1s. 8½d. per 1000 cubic feet sold. At Salford, it was 1s. 6·18d. Evidently our Manchester friend wants a readjustment of his datum. We can say one thing, however, for the comfort of Manchester. Nowhere is the cost of capital so low—2d. per 1000 cubic feet. If the profit made is too great, at 9·4d. per 1000 cubic feet, that is more a matter of politics than of gas making, and would not necessarily be altered whatever change might be made in the system of doing business.

It does not follow that a large increase of every or any use of gas necessarily cheapens the cost of providing it. Gas for domestic firing, for instance, which is the use in question, is not at all a desirable line of the trade in itself. It comes just when the works are taxed to their utmost capacity already, especially during foggy times; and where there is much of it, the gasholder capacity has to be increased rather than reduced. If the output of a gas undertaking could be increased threefold, as Mr. Livesey stated at the South Metropolitan meeting, it might be that the gas would be no cheaper. Such, at any rate, is the South Metropolitan experience. Lastly, our contemporary dismisses as "simply ridiculous" our observation, which applied to the warming of professional and commercial offices in large towns, that gas-fires cost no more in such circumstances than coal "with attendance." The latter remark has

clearly escaped him. The practical question in the case is simply as to what the occupier is charged. The traditional cost of coal-firing in a London office building is 6d. a scuttle, or per day. It can be done with gas for that; and more of it would be done, if the sellers of the gas were more enterprising, and did not mind pushing their wares like other traders, instead of waiting for customers to come to them.

The Welsbach Actions Within Sight.

The writs against the United Chemical Works (better known as the Guaranty Mantle Company) and the Voelker Mantle Company must now be faded and worn with old age. It is nearly two years since they were served; and, after the delay that has taken place, with the frequently blighted hope that the country was about to know the rights of the matter, it is a positive relief to be assured that we are within two or three weeks of the celebrated 1893 patent being put on its trial. It is no secret that the Lord Chief Justice holds decided views about this Welsbach litigation; and he is of opinion that each party has been trying to delay the other. But, if this is so, there is to be no more of it. The Welsbach Company have put the United Chemical Works case down for trial this week; but it is not likely to be reached in any event for a fortnight or three weeks. On Friday, an effort was made to obtain a little further delay on the part of the defendants, by means of an application to the Lord Chief Justice that the Guaranty and Voelker cases should be taken together. The former is complete; but the latter (through whose fault is not altogether clear) is not, and it may be some two or three months before it could come to trial. His Lordship refused to grant the application, though he offered to have the cases put in the list for the same day, so that, if the Voelker happened to be ready, the Judge before whom they will come could determine whether or not they should be heard together. It will be seen that, if the application as preferred had been granted—the one case being ready for hearing and the other not—it would have given the defendants more breathing time. After the long wait we have had, little harm would have resulted, excepting perhaps to the Welsbach Company, who naturally, in view of recent events, are not wishful now of granting any rope to their enemies by which they will gain strength. In the case of the United Chemical Works, the question, so far as we understand it, rests wholly and solely upon the validity of the 1893 patent. But, in the Voelker case, there is at least another point to be settled; and we believe it is that, assuming the 1893 patent to be good, is the Voelker mantle really an infringement? Therefore if the Welsbach Company win the Guaranty case, we shall likely hear more later on of the Voelker.

The Attitude of the Gas Industry.

It looks suspiciously as though the action of Mr. Livesey in fathering a guarantee fund for the purpose of ensuring that want of funds shall not be the cause of an inadequate trial has had something to do with the hastening on of matters by the Welsbach Company. The position has certainly become serious for them; and the Directors would have been poor generals indeed if they had allowed the enemy longer grace for fortifying his position. Mr. Livesey, recognizing the necessity for speedy action, has not let the grass grow under his feet. Last Wednesday the guarantee fund amounted to £2950—the contributors being the South Metropolitan Company £2000; the Commercial Company, £500; the Crystal Palace Company, £300; and the Wandsworth and Putney Company, £150. By Friday evening, Mr. Frank Bush, the Secretary of the first-named Company, had in the post a circular to gas companies and authorities explaining the action, and inviting promises of subscription. Of course, the larger the sum guaranteed, the smaller will be the calls, and the greater the number of guarantors, the lighter will be the burden—besides giving to the movement a stronger standing and rank as a representative effort. Mr. Livesey thinks that a guarantee of £25 for each 100 million cubic feet of gas sold per annum would be sufficient; but let it be borne in mind by Directors and Committees that the more generous the guarantors are, the better. The fund is to be controlled by a Committee to be appointed; but, in the meantime, as matters are now moving at a quick pace, all who are interested in the proposal are requested to communicate with Mr. Frank Bush, at No. 709, Old Kent Road, S.E. It may be repeated that the object of the fund is to secure what all in the gas industry must desire, and that is a full and complete trial of a question in which gas suppliers have a very deep concern. The "fund "is not," the circular states, "for the purpose of supporting "any special maker or seller of mantles, but to assist in such "*legal and proper manner* as may be found practicable in the "defence of any action that may be brought by the Welsbach "Company in support of their patents."

A Recent Unwarrantable Statement.

The late Directors of the Welsbach Company were of opinion that the gas industry were opponents of all forms of gas economizers, including Welsbach mantles. We wonder what they think of this movement, from within the industry which they slandered, to obtain cheaper mantles, in order the further to popularize them. The shareholders have an answer here to this particular statement, which was flaunted before them with steady persistency. The gas industry would like to know who it was that succeeded in deceiving Sir Henry Burdett and his colleagues in this way.

The Devonport Award.

The award of Mr. James Mansergh in the Devonport Gas-Works Arbitration only emphasizes the lesson taught by the proceedings before the Parliamentary Committee last session. The Company had got hopelessly behind the times, as any company must do which, in the midst of a growing community, schemes and contrives to avoid the full measure of its responsibilities, and keeps away from Parliament for half-a-century. In circumstances like these, the Devonport Company fell an easy prey to the Corporation. When it was at last compelled to go to Parliament, it was practically without a leg to stand upon, and surrendered at discretion to the attack of the Municipality. In the arbitration it has fared little better. Mr. Mansergh, it is true, has not adopted the exceedingly low valuation placed upon the undertaking by the gentlemen who represented the Corporation. He has found a figure of his own, which, however, agrees almost exactly with the 25 years' purchase of the maximum dividends which the Corporation experts suggested as the correct basis for calculation. The Umpire appears not to have accepted the Corporation's view that the works are deficient in dividend-earning capacity to the extent of some £22,000 or £23,000; but he was still farther from agreeing with the Company's advisers that the undertaking should be valued on the basis of 30·77 years' purchase. By the award, the Company get 25 years' purchase without any deductions. The effect, therefore, of all the doubtful economies and contrivances of the past is that the town becomes possessed of a cheap undertaking at the expense of the shareholders. Reckless capital expenditure is to be deprecated; but it is certainly no advantage to a company to starve its works, and restrict the supply, merely to reap a reward like this.

Progress at Newcastle.

Sir W. H. Stephenson, at the recent annual meeting of the Newcastle and Gateshead Gas Company, treated the shareholders to a very interesting sketch of the history of gas lighting in the district from its commencement in 1817 down to the present time; and the value of his remarks was greatly enhanced by the distribution among the shareholders present of copies of the first prospectus. If these glimpses into the past, by showing what has been done, spur those connected with the industry on to an endeavour to achieve still greater things in the future, they will serve a very useful purpose. We trust that this may be their effect, and that a study of the marvellous progress already made will not generate a comfortable feeling of complacency, and a tendency on the part of those interested to rest on their oars. There being no means of measuring the quantity of gas consumed at the period of its introduction into Newcastle, the suppliers (the Newcastle Fire Office) regulated the charge per burner according to the time at which the customers agreed to turn the gas off. No wonder that meters have always been regarded with a certain amount of animosity, considering the comfortable little arrangement that they superseded. This method of payment subsisted until 1830, the date of the formation of the first Company—the Newcastle Subscription Company—which was formed with a capital of £30,000; while the authorized capital of the present

Company is £3,557,897, of which, however, £1,234,558 is still unexhausted. The revenue of the first Company was £8895; that of the present one is £387,066. And still the consumption is going up by leaps and bounds, doubtless owing in great measure to the energetic policy of the Board, who are always keen on adopting improved methods and up-to-date arrangements of known advantage. In carrying out this policy, they have the hearty co-operation of their chief officials and the staff generally; and they are ready to recognize faithful service. This is shown by the fact that a short time ago they renewed the engagement of their Chief Engineer (Mr. W. Doig Gibb) on terms which were highly satisfactory to him; while at the meeting last Wednesday a substantial increase was made in the salary of the Secretary (Mr. T. Waddom). We cordially wish for the important undertaking in the management of which these officers have so large a share, a long continuance of the success which has hitherto attended it.

Liverpool and Water Gas.

We are certain Mr. J. E. Tinne, who presided at last week's meeting of the Liverpool Gas Company, will not regard it as uncomplimentary to himself when we say that Sir Edward Lawrence (who was most unfortunately absent through illness) was greatly missed on the occasion. The periodical speeches of the Chairmen of certain Gas Companies are always looked forward to with interest; and among these, the deliverances of Sir Edward are by no means the least noteworthy. But the task imposed on the Deputy-Chairman was not a hard one; for the course of the Liverpool Gas Company during the past half year has been a smooth one, and there was nothing but what was satisfactory to report to the shareholders. The falling off of over 1 per cent. in the consumption which took place in the first half of 1901 was happily replaced by an increase of about 2¼ per cent. in the last six months of the year; but of course the drop in the value of residuals has been felt here as elsewhere. No discussion on Liverpool gas affairs would be complete without a reference to the vexed question of the supply of water gas by the Company; and as the matter was not alluded to by Mr. Tinne in his speech, a shareholder (who is also an Alderman) promptly supplied the omission, and appealed to the Board to "climb down," in view of the recommendation of the Lighting Committee of the Corporation that a deputation should wait on the Home Office with a view to urging on the Government the advisability of introducing a Bill carrying out the recommendations of the Departmental Committee. However, the dispute is too old now for the Directors to be alarmed at the prospect of certain members of the Corporation enjoying a nice little trip to London—to say nothing of the fact that the recommendation in question has not so far even been confirmed by the City Council. It was pointed out that the expense of reverting to a larger production of coal gas would be considerable, and that the Company would not be justified in incurring this before they knew what form any possible legislation on the subject would take. And really it is difficult to see how any Act could be passed which would affect the present policy of the Company; for the Government could hardly go behind the recommendations of the Home Office Departmental Committee. This Committee, after full consideration of the matter, came to certain conclusions, which they embodied in recommendations; and to these recommendations the Company assert that they have always strictly adhered. They are clearly within their rights, though we feel sure that if the Directors had the slightest cause to think that the supply of water gas involved unnecessary danger to the consumers they would not allow any considerations of principle or of expense to stand in the way of their altering the system of manufacture.

Carburetted Water Gas Economy.

When the Tottenham and Edmonton Gas Company introduced carburetted water gas into their manufacture, now some years ago, there was a question in many minds as to whether or not any advantage would accrue from it. Speaking at the meeting of the proprietors last Saturday, the Chairman (Mr. Corbet Woodall) stated that the Company have found the production of carburetted water gas distinctly to their advantage, both from the point of view of economy and of efficiency of service. During the past half year, with oil at the comparatively high price of 3⅜d. per gallon, the Company have made carburetted water gas of high illuminating power at a cost of 3d. per 1000 cubic feet less than coal gas! This is interesting information; but gas engineers would have been deeply obliged to Mr. Woodall if he had gone a little further, and given them the details on which the comparison was based. In view of the busy times at Westminster, we can hardly ask him to favour us with the information now; but perhaps Mr. Broadberry could supply the figures. Anyway, as we have recently stated, oil is now purchasable at 2½d. and under per gallon, and coke is cheap. This being so, some comparative figures on the subject at the Tottenham meeting six months hence will be very acceptable.

Gas and Water Officials and Small-Pox.

The infectious disease which is scourging London and the suburbs at the present time has affected Tottenham with as great a virulence as any part. This may be accounted for by the considerable working-class population there, whose employment lies chiefly in the East-end of London. But the point of this notice is that the Directors of the Tottenham Gas Company have taken steps to have the whole of their official and outdoor staff vaccinated; and the hint might be taken by the Metropolitan and surrounding gas and water companies. Gas and water officials are constantly entering houses, and coming in contact with different consumers of all classes. Being so exposed to infection, they stand in personal danger; and not only so, but they might be the innocent means of conveying the terrible complaint among their comrades and to other consumers.

"Partial" and "Inclusive" Incandescent Maintenance.

There is no doubt about this question being one of the topics of the hour in gas management circles; and our "Correspondence" columns this week contain some material which will be keenly examined—particularly by those who have adopted the "inclusive" maintenance system, by which we mean the entire upkeep of the burner and mantle for an inclusive charge, in contradistinction to the "partial" maintenance system which asks a small payment of the consumer for periodic cleaning and attention to his burners, and an additional payment for such mantles as he may require. It may be suggested that in future discussion, a discrimination be made between the two systems by the use of the terms "inclusive" and "partial" as adopted here. But turning to our correspondents' letters, it will be seen that they both deal with partial maintenance, and both are good testimonials as to the sufficiency and efficiency of the plan. But, by the way, Mr. J. H. Cornish asserts that we described Mr. Shoubridge's proposal to adopt the partial system as "original and novel." We did not go quite so far as that; but we confess to applying to it the descriptive word "new." In view, however, of our correspondents' communications, we find no difficulty in swallowing this little adjective; more especially as Mr. Cornish says he booked his first order under the partial system as early as Oct. 17, 1900.

Surprising Results.

Both "Maintenance" and Mr. Cornish charge the consumers for tending their burners 3d. each burner per quarter. The examples given in the table of the first correspondent are excellent ones for study; and readers may take our word when we say that the figures emanate from an Engineer whose statements are always received with respect, but for certain reasons he prefers on this occasion not to disclose his identity and location. Looking at his total costs per burner per annum, it will be noticed that, under this partial system, the consumers get a pull over consumers in places where there is an inclusive charge, of 9d. a burner per quarter. Mr. Cornish gives the partial system a good recommendation when he says that by it he has brought 50 per cent. of the incandescent burners in Bridport under his wing, that not one consumer has withdrawn from the scheme, and that new ones are constantly coming in. In Mr. Cornish's case the mantle renewals average under 1½ per burner a year; and "Maintenance," in quite another part of the country, runs a little either side of this figure with 1·06 and 2·06 mantles, in the two installations taken as examples. These low renewal figures seem to bear out the contention that consumers under the partial maintenance system exercise some care in guarding their mantles. In London the Welsbach Company's renewals, under the inclusive maintenance, work out to 4 per annum; and we hope

to receive the experience of gas managers on this head in places where there is not quite so much bustle as in London. If Mr. Shoubridge found his hope as to the ultimate success of his scheme damped by the little trace of doubt in Mr. Livesey's reference to it, and by the conclusions drawn by Mr. H. E. Jones from experience in other directions, he may take heart again from the experience recorded this week of two engineers in widely separated parts of the country. Maybe the partial maintenance system will win after all. We shall see.

Parliamentary Committee Work.

The work on Private Bills is being hurried on this year. The Committee of Selection have been very busy within the last two or three weeks; and to-day will see a commencement made with the consideration of Bills in the Committee Rooms. This is nearly a month earlier than the time at which a start was made last year; and in all probability the Coronation has something to do with the expedition that has been shown. The quick march of events has caused the Parliamentary Agents and expert witnesses to be extraordinarily busy in making their preparations for meeting the Committees. A large number of petitions have been lodged against Bills; and the lawyers and expert witnesses no doubt find their hands pretty full of work. However, there is not very much that is novel or thrilling about the Gas and Water Bills this session; but it will be a poor and abnormal one if it does not produce points of interest and little surprises. Not much will be done this week; but, in a few days, work is likely to be in full swing.

Producer Gas in Engineering.

It was only natural to suppose that when Mr. W. Foulis accepted the presidency of the Institution of Engineers and Shipbuilders in Scotland, he would endeavour to direct the attention of the members to subjects allied to the industry with which he is associated, with the view of showing them how the staple of that industry might be made to subserve their professional or commercial interests. We were not surprised, therefore, to find that his Inaugural Address was devoted mainly to matters more or less closely connected with his special branch of engineering. Indeed, in adopting this course, he was only following the example of his predecessors. We dealt fully with the address at the time of its delivery, and only refer to it again to notice what may perhaps not be improperly called its first fruits. Two of the subjects discoursed upon by Mr. Foulis were the utilization of gas for the direct production of power by its combustion in engine cylinders, and the gasification of coal in producers. Upon these he probably thought members of the Institution should have more detailed information than he was able to furnish in the limits of his address; for we presume it was due to his initiative that the "Proceed-"ings" will be enriched by the contribution of Mr. Dugald Clerk, to which reference was made in the "JOURNAL" for the 28th ult., and that by Mr. F. J. Rowan, from which some extracts are given to-day. Mr. Clerk traced the progress of the gas-engine until it had reached a stage of perfection which justified him in predicting that it will be the engine of the present century; while Mr. Rowan exhibited, by the aid of the lantern, the latest types of gas-producers in use. These two papers on such closely-allied subjects as the production of a special gas for power purposes and the media for its profitable utilization, were masterly productions; and the Institution must be congratulated on having them upon the records of its proceedings.

Sulphate of Ammonia and Agriculturists.

How great the work that the Sulphate of Ammonia Committee has before them, and how difficult they find the task of eradicating old notions from the minds of agriculturists, and implanting in their place the teachings of science, is shown by the article which appears elsewhere incorporating the main features of the last report of Mr. John Hunter, the expert adviser to the Committee. The report throughout illustrates how the application of sulphate of ammonia produces largely increased weights of crops, which increased weights in many cases augment the value of the land by several pounds per acre, at a cost for sulphate of merely a few shillings. Yet in 1900, this country only took a quarter of its sulphate production—allowing three-quarters to go abroad to those countries where the technical educational systems have prepared the agriculturist for the intelligent acceptance of the truths of science! Our farmers must be bullheaded fellows if they continue to permit the intelligent foreigner to come and beat them with sticks taken out of their own fields. The Committee's chief object is to maintain the price of sulphate for the benefit of the producers. To do this, they must create a larger demand. And to do this again, as the present report shows, costs money. The Committee deserve the encouragement of all who have sulphate for sale.

WATER AFFAIRS.

The Opposition to the Government Bill.

IN dealing with this matter last week, we showed that the London Water Bill is threatened with attack from several points when it comes up for second reading. According to the answer given by the First Lord of the Treasury to Mr. Sydney Buxton on Thursday, the forces of the enemy will be concentrated upon the measure on the 27th inst., and if its destruction is not effected before the rising of the House, hostilities will be resumed on the following Monday. The attitude of the honourable member for Poplar on this question has already been indicated. He intends to challenge the whole policy of the Government thereon, and divide the House on party lines; and in this course he will have the support of the front Opposition Bench. This will be the first point of attack. The next will probably come from the Water Companies, as indicated by the notice of motion given by Mr. E. Boulnois, who, although acting, we believe, quite in his individual capacity, may be considered as expressing the general feeling in regard to the Bill entertained by the directorates of the Water Companies. This may be inferred from the tone of a circular issued by the Governor of the New River Company—Mr. H. C. B. Bowles—who points out therein the objectionable features of the Bill (in the main they are those to which attention has been called in the "JOURNAL"), and asks the shareholders to induce Members of Parliament to withhold their support to a second reading, unless an undertaking is given by the Government that the necessary alterations shall be made for the due protection of the parties most nearly concerned. He strongly condemns the proposal to transfer to the Water Board the Companies' works and property, together with their books and papers, officers and servants, before any purchase price is paid or even determined; and he urges that, if it were to be carried into effect, they would be deprived of the means of protecting the interests of the shareholders before the Arbitrators, except so far as the Local Government Board might grant money or facilities for the purpose. In addition to Mr. Boulnois, the Chairman of the East London Water Company, Colonel Lockwood, the member for Epping, has given notice of his intention to obtain from the House, if possible, an expression of opinion that no Bill to transfer the Metropolitan Water Companies will be satisfactory which does not provide for the compensation being "ascertained and paid" in the manner recommended by the Llandaff Commission, and in accordance with the practice hitherto adopted "in all cases where "any property or undertaking is acquired for the public "benefit." One of our daily contemporaries considers the Water Companies are satisfied with Mr. Long's Bill. The action of three of their Chairmen testifies to the contrary.

Finally, there will be the opposition of the Progressives of the London County Council, who gave expression to their views on the Bill at the "protest" meeting held in St. James's Hall on Monday evening last week. In a fairly large and enthusiastic gathering, only one dissentient vote was recorded on the resolution submitted by Mr. Dickinson, the former Chairman of the Council, whose name is closely identified with the London Water Question, in which strong objection was raised to the proposal of the Government to hand over the vast interests of London in its water supply to "an irresponsible authority constructed on the discredited "model of the Metropolitan Board of Works," and of which the London ratepayers would have no effective control. The whole tone of the speeches indicated a feeling that the County Council had been snubbed. It was acknowledged that the Bill has certain good points in it—those which the Government have paid the Council the compliment to borrow from them; but it was contended that they

are overshadowed by most objectionable provisions. In short, the Council still consider that they ought to have been entrusted with the purchase of the water undertakings, the possession of which they have so long coveted. It was urged that the proposed Water Board would be not only unworkable, but—worse still from the ratepayers' point of view—it would be unrepresentative and irresponsible. It would be as far removed from healthy contact with the people and the electors as ingenuity could possibly devise; whereas the Council were directly elected, and lived in the light of day. The Bill meant nothing more nor less than the abolition of a directly elected authority. As for the Borough Councils, they did not ask for what was given to them, and did not want it; and, speaking for Battersea, Mr. Burns declared that they would not have it at any price. The determination with which opposition to the Bill is to be prosecuted was shown by a declaration that it would be no fault of the Progressives of the County Council if the Government did not fall on account of water, as a preceding Administration had done. It is unnecessary to dwell further on the matter now. There are pretty clear indications of a rather stormy debate next Thursday, upon the possible result of which it would be useless to speculate. It does not appear, however, at present, that Mr. Long's efforts to settle the Water Question will be more successful than those of his predecessors.

Prevision in Glasgow.

The Corporation of Glasgow did a commendable piece of work at their meeting on Thursday, in sanctioning an application for a Provisional Order to authorize the borrowing of £500,000 for extending their water-works so as to give the city an additional supply of 10 million gallons of water daily. The scheme by which this will be effected is fully explained in the report thereon prepared by Mr. J. M. Gale, the Water Engineer, the chief features of which are given in another part of the "JOURNAL." Briefly, it is to complete the works authorized by the Act of 1885, by raising the level of Loch Arklet (which, as many of our readers will no doubt remember, lies to the left of the road from Stronachlachar to Inversnaid), and leading the water therefrom to Loch Katrine, so as to bring up the available supply from that romantic lake to 75 million gallons daily. This addition is not urgently called for, as the Craigmaddie extension more than supplies the present needs of the city. But seeing that Loch Katrine's water-yielding capacity will be reached by 1907, it is assuredly none too soon to take steps to augment it. In connection with this scheme, it is intended to lay a new 24-inch main from the Gorbals works, which will considerably improve the pressure of water in the high-lying districts on the south of the Clyde. The proposed expenditure on these works comes at a time when Glasgow has in contemplation other large financial projects which, including the one we are specially dealing with, will add £1,250,000 to the funded debt of the city; but it is not our business to discuss their merits. They may or may not be necessary. With regard to the water scheme, there are two points to justify it. The population is growing, and the consumption of water increases in greater ratio than that growth. Hence the necessity for the exercise of foresight in order that demands which must arise may be adequately provided for. The water supply of Glasgow stands before the world as the model of what a municipal service of this kind should be. The decision of the Corporation on Thursday is a proof, if any were needed, that they do not intend to jeopardize the reputation of the city by hesitating to undertake works which their engineering adviser considers to be necessary for the future requirements of the citizens. The additional £500,000 will bring up the borrowing powers of the Water Department to £4,000,000; but, as the "Glas-"gow Herald" is careful to point out, the investment is a remunerative one, for it is in works for which the children of those who have undertaken them should "rise up and call "them blessed."

Devonport and its Neighbour.

There is the making of a pretty quarrel between the Devonport and Plymouth Corporations about the question of water supply. In their anxiety to obtain possession of the Devonport Water Company's undertaking, and to put as good a face as possible on this enterprise, the Devonport Corporation have presumed upon the co-operation of the Plymouth Corporation, and apparently have presumed too far. In one of the paragraphs of their petition against the Water Company's Bill, the Devonport Corporation suggest that if the Company's undertaking is transferred to them, an opportunity would be afforded, by co-operation with Plymouth, for the establishment of a Joint Water Board, or some other arrangement which would enable them to use the storage reservoir recently constructed by Plymouth. The same thing has been hinted at in speeches in support of the Devonport scheme of municipalization. The idea underlying it is that, by some kind of co-partnership in the water-works, Devonport might draw upon the Plymouth reservoir in times of need, and thus save the great expense which the Water Company propose to incur in the construction of a separate storage reservoir. But Plymouth will have none of it. In a letter which he has addressed to the Town Clerk of Devonport, and has sent to the local newspapers for publication, the Town Clerk of Plymouth complains that the possibility of any arrangement of the kind should have been suggested without consultation with the Plymouth Corporation; and he adds that the Plymouth Water Committee "cannot consent to the formation of a Joint Water Board or "to any interference whatever by the Devonport Corpora-"tion with the control and management of the Plymouth "water undertaking." If the tone of this communication rather recalls the ancient quarrels between Plymouth and Devonport (or Plymouth Dock, as it used to be called), certainly no complaint can be made of lack of clearness and definiteness in it. It is about a hundred and fifty years since Dr. Johnson, then on a brief visit to Plymouth, took sides, like the "good hater" that he was, in the disputes existing between Plymouth and the neighbouring town about the water supply. He declared that the rogues of Dockers might die of thirst; they should not have a drop of Plymouth water. Plymouth is much of the same mind to-day. It would not be unwilling to listen to overtures from Devonport for the amalgamation of the two towns; but it will certainly not consent to what the Town Clerk describes as "interference" by Devonport as a separate Corporation with any of its municipal institutions. Whether it is right or wrong in this, Plymouth has knocked away one of the props upon which the neighbouring Corporation were relying for support in their water purchase scheme. Many ratepayers in Devonport are sceptical as to the advantages which will accrue to the town from the municipalization of the water-works; and their opposition will be increased by the knowledge that no help can be expected from Plymouth in regard to the large capital outlay the venture will need.

Is a Public-House a Shop?

As compared with some of the conundrums with which Judges are confronted in the exercise of their duties, the above question appears to be a simple one. It was raised by a Hawick licensed victualler, who claimed that he was entitled to be assessed for water-rate at one-fourth of his rental, as in the case of shops. The Police Commissioners, on the other hand, contended that a public-house was not a shop, and that in any case there were "special circum-"stances" entitling them to levy on the full rental, inasmuch as a public-house used more water than a shop. The Hawick Sheriff Court decided that a public-house was not a shop within the meaning of the Burgh Police (Scotland) Act, 1892; but on appeal this decision has been reversed, and the case has been remitted back. Sheriff-Principal Salvesen, in giving his judgment, remarked that there was no definition of "shop" in the Act referred to; and though the term was not usually applied to a public-house, it seemed to him that such places must come under any legal definition of the word. The question of "special circum-"stances" his Lordship did not include in his judgment; but he said he saw no valid reason why the Commissioners should not deal with shops in classes, where they had cause to believe that a particular kind of business involved the consumption of large quantities of water.

Sir William Roberts-Austen, K.C.B., F.R.S., will deliver the tenth "James Forrest" lecture, on "Metallurgy in Relation to Engineering," at the Institution of Civil Engineers, on Wednesday, April 23. The date has been unavoidably altered from that originally proposed.

The "Pall Mall Gazette" recently contained the following special telegram from Berlin: "A letter published from Hamburg states that Herr Karl Fietz, a chemist, has invented a fluid which, in combination with water, becomes capable of acting as an illuminant, like petroleum. At the same time, the heat developed is stated to render the liquid practically useful as a fuel. A company is being formed to develop the invention."

ESSAYS AND REVIEWS.

THE EARLY HISTORY OF INCLINED RETORTS.

(*Concluded from p. 407.*)

In the latter half of the year 1889, an awakening to the advantages and importance of the principle of M. Coze's method for the carbonization of coal seems to have started among English engineers. Mr. Frank Morris, then Engineer to the Brentford Gas Company, visited Rheims; and on Aug. 20, it was announced that he was so favourably impressed with the arrangement that he was about to erect a trial setting. A much more important announcement was made by the "Journal," in an "Editorial Note" on Oct. 29, 1889—being "An Invitation to English Gas Managers" to visit the Rheims Gas-Works in a collective body for the purpose of witnessing "a crucial trial on the spot with English caking coals." Hitherto M. Coze's inclined-retort setting had been seen by several individual engineers, and stragglers from that year's Paris Exhibition, where a model of it had attracted some attention. Hitherto also, only French and Belgian coals had been carbonized in the Rheims plant; and naturally English engineers were somewhat dubious about the arrangement being found equally suitable for the caking coals they had to use.

The test was arranged to be made on Nov. 7, 1889; and the names of those proposing to take part in it were to be sent to the "Journal" offices. Mr. Henry Woodall was greatly interested in the matter, and was one of its prime movers. The words of the "Editorial Note" at the time are worth repeating: "This is a novel project. But no words of ours are needed to prove the importance of the issue that hangs upon the success of this experiment; and the proposed inspection is certainly the quickest and cheapest way of testing the claims of M. Coze to have solved the problem that has baffled all his predecessors in this line." Well, and what was the result of this test? It passed off "with great success," which was the verdict recorded in another "Editorial Note" on "The Trial of the Coze System."* It went on to say that "both North Pelton and Pelaw Main coals have been carbonized in the inclined retorts; and if they will deal satisfactorily with these materials, they are good for anything in the way of caking coal." What a comment upon those who now-a-days talk of "slipping" and "creeping!" And are not the coals named the very identical ones against which such charges have lately been made? Yet here, on Nov. 7, 1889, in the original Coze setting of inclined retorts at Rheims, a special test on these very coals was carried out, and there was no breath or whisper of slipping or creeping, but everything passed off "with great success!" The "Journal" leading article, in the light of later events, is very interesting. It ran:

> It is in the highest degree pleasing to learn, on the unexceptional testimony of Mr. Henry Woodall and the other members of the party of inspection at Rheims, that their trouble, and our recommendation, have not been thrown away; and that a system of retort-working has really been found which may supersede machinery, as well as hand labour in carbonization. Nothing can be simpler than the whole scheme of working the inclined retort; and when adapted to stage houses, as it will be when introduced into England, it may be developed to an extent that even M. Coze can hardly anticipate. . . . The system of inclined retort setting has awakened out of a long sleep, and apparently means business. . . . Every gas engineer who adopts the original system into his works will do his best to improve upon it.

All of which has indeed proved very true; and not only this, but warning was also given to M. Coze that rivals would spring up, which they did, and that with success his difficulties would begin, which, again, they unfortunately did. With regard to the rivals, a correspondent, who preferred to be distinguished by the quaint pseudonym, "Put Yourself in His Place," protested against patents being granted to English imitations of the Rheims method of carbonization—signalling out a grant to Mr. Alfred Kitt for an "excellent counterpart of M. Coze's system of inclined retorts." Whereupon Mr. Kitt rushed into print from the Gaslight and Coke Company's works, Lupus Street, Pimlico, and politely said: "For the information of this meddling partizan, let me state that I designed, in 1884, a setting of three large retorts on the inclined principle, chargeable from a centre mouth." He disclaimed any credit for himself, and kindly enough for M. Coze as well, but said it ought to be given to Mr. W. Key, of Glasgow, to whom reference has previously been made in this article. Mr. Kitt added the information that the Directors of his Company had generously decided to try both M. Coze's and his own systems. To conclude this little incident, Mr. Kitt's rights, whatever they were, were afterwards taken over by the English proprietary Company of M. Coze's patents.

Before leaving 1889, which may be considered the year of the first practical launching in England of the inclined retort's career, it must be stated that Mr. Frank Morris, as previously referred to, experimented with a 20 feet long straight-through retort at the Southall works of the Brentford Gas Company. This was immediately followed by a setting of seven similar retorts at the same works, and started on Oct. 22. These retorts were fed with coal from a small truck, which got its supply from a storage hopper. The coal was dropped from the truck through an independent telescopic charging shoot, adaptable to each retort level, and patented by Messrs. Morris and Van Vestrant on Oct. 18. This shoot was afterwards modified for a separate one for each tier of retorts, which proved more convenient and rapid in charging. Another item, which may just be mentioned as relating to 1889 and to inclined retorts in America, was a patent taken out by Messrs. Humphreys and Walton Clark for a combination of the system with water-gas generators. In the "Journal" for Dec. 24, it was stated that this arrangement was then actually on trial in a works at Jersey City. Further details of this experiment we do not know; but the suggestive remark is made that "this additional evidence tends to prove that the supposed objections to depending upon gravity for charging retorts are either chimerical, or capable of being overcome by simple adjustments of the charging apparatus." This fact has apparently yet to be learned by some gentlemen, judging from recent remarks in a discussion that took place at Wakefield.

We now come to the year 1890, which proved to be a very busy one as regards the inclined retort system. At Brentford, which became, with Rheims, the Mecca of gas engineers and their perambulating committees of inspection, designs were prepared for an improved arrangement of eight beds of seven retorts per bed, each 20 feet long, with overhead hoppers, charging-hoppers or measuring chambers, scoops, checks, and other details, which together formed, in principle, the now recognized method of constructing and working inclined-retort installations. The Brentford works, it is also interesting to note, eventually became the first where the whole of the coal gas made was produced from inclined retorts. About the same time also, the Gaslight and Coke Company arranged to put up at their Kensal Green station two lines of arches, set back to back, having thirty-four beds of seven retorts in each line, or 476 retorts in all. These were, however, built on the unimproved Coze pattern, with the original cast-iron charging shoot. They proved unsatisfactory. In fact, many of the attempts, earlier as well as some later, on the part of the two great London Companies to establish settings of inclined retorts have not been altogether successful.

The Provinces were well to the fore in this retort-house innovation; the Corporation of Rochdale, under the engineership of Mr. T. Banbury Ball, having the honour of being the first to adopt the new system. Its Sub-Committee visited Rheims; and in June, 1890, the recommendation to put up five beds of seven 15 feet long retorts, at an estimated cost of £3500, was approved. By Dec. 2 of the same year, the installation was, practically speaking, complete—two of the arches being then under fire. The charging was effected by means of three travelling swan-neck hoppers, arranged for the three tiers of retorts. This is given as an example of other towns which followed suit; among them being Burnley, and, later on, Coventry, Huddersfield, Leigh, Manchester, Middlesbrough, and West Hartlepool. In June, 1890, also, the first English technical paper on the subject was read by Mr. Van Vestrant at the annual meeting of the Gas Institute; the title of it being "An Automatic Process for Charging and Discharging Gas-Retorts by Gravitation." This seems to show, perhaps, as has since been urged by some, that in the early days, advocates of the system really claimed too much for it as an altogether automatic means of complete coal carbonization—thus raising prejudices and causing disappointments. Another paper given to the American Gaslight Association was by Mr. Frederic Egner, the Engineer of the Laclede Gas Company, of St. Louis, who said that, after the experience gained with the setting of five retorts previously mentioned, it had been decided to erect eight other beds of seven retorts each.*

It was in the year 1890, also, that the Automatic Coal-Gas Retort Company, Limited, was formed; its prospectus being issued, and its subscription list opened, with the "Journal" for July 8. It was floated with a capital of £250,000, in £1 shares, "to acquire the patent rights for the United Kingdom of M. Coze's system of charging and discharging gas-retorts, with Messrs. Morris and Van Vestrant's improvements thereon." M. André Coze's original patent in England, for "Improvements in Retorts for the Distillation of Coal and other Solid Matters, and Apparatus in Connection therewith," was dated June 20, 1885. The Company had a somewhat unfortunate financial career; but none the less, to its Engineers, Mr. Van Vestrant, and, after his early retirement, to Mr. Maurice Graham, who had been associated with the Company from the very beginning, every credit is due for having successfully pioneered so many installations of inclined retorts throughout the country. In Mr. Maurice Graham, in particular, has the system had the advantage of a lengthy, continuous, strong, and judicious advocacy, from the days of his chief engineership to the Proprietory Company to those of his directorship of the firm of Messrs. Graham, Morton, and Co., Limited. The later history of the Automatic Coal-Gas Retort Company will be fresh in mind. How the validity of its master patent was attacked by the Corporation of Salford, who refused to pay royalties on an installation they had put up; how Mr. Justice Romer, by his decision of March 23, 1897, upheld the Company; and how, finally, on their applying to the Privy Council on June 14, 1899, for the prolongation of the inclined retort patent, the application was refused. These, and many other matters connected with them, will be remembered, and are to be found fully recorded in the "Journal."

Nothing much remains to be said of the years 1891 and 1892, which we skipped in order to follow the sequence of the late

* See "Journal," Vol. LIV., p. 912.

* See "Journal," Vol. LVI., p. 1045.

Automatic Coal-Gas Retort Company. They were very similar to the previous one; the same committees of inquiry and investigation, the same doubts, the same arguments, some successes, some failures, but throughout all continued striving toward improvement, increasing progress, wider knowledge of requirements, and greater security of success. Thus we leave the history of the inclined retort at the end of the second period into which we divided it. As was said, its third period is even now in the making; but in looking over the past two, we can have but little doubt that the verified predictions of the "JOURNAL," which have been given, will still hold good in a large measure as regards this country, and perhaps larger still as regards others.

A SCHEME OF VENTILATION WITH GAS-WARMED AIR.

THE popularity of gas lighting for public halls, churches, and places of public resort generally is tightly bound up with the provision of adequate and comfortable ventilation. The imaginary superior healthfulness to gas of electric light, based on the indubitable fact that it is not a light of combustion, is always the main argument of electricians, and is the sole set-off which they are able to adduce against the higher cost of electricity as compared with gas lighting. It would be a blunder for gas engineers to underrate this argument, which, indeed, always carries much weight, and possesses a certain foundation in fact which renders the excessive inductions usually drawn from it for commercial purposes extremely difficult to combat in the interests of common sense and economy. Without doubt, there are interiors and circumstances where the incandescent electric lamp is a great luxury—like the ability to have a fire in one's bed and bath room during cold weather; and those who are able to afford it will always do so. They would be very foolish if they did not. But these are not the places or the circumstances that very greatly matter, from the business standpoint, to the suppliers of either gas or electricity for lighting. The really important truth is, that for all interior lighting on a large scale, the necessity of proper ventilation for the sake of the health of the inmates is not materially affected by the selection of the means of lighting.

We would not be misunderstood upon this all-important point of hygiene, and therefore will explain that the observation applies only to modern lighting practice of the best kind. Of course, if it is sought to produce a dazzlingly brilliant effect of light by the least suitable means, it is only possible to succeed at all by making the arrangements on such a scale that consequential inconvenience is sure to result. Thus, candles and oil lamps are, and in all probability always will remain, favourite means of lighting some classes of interiors, in a particular way; but if they are overlavishly employed, the effect upon the atmosphere and the temperature of the apartment will be unpleasant and injurious to the occupants. The same remark applies to gas, when burnt in the old-fashioned style by means of flat-flame burners. The heat of the products of combustion is here a very noticeable accompaniment of the light produced, especially in the case of flat-flames disposed horizontally, which used to be so much affected in church and public hall lighting. That is, of course, quite unnecessary. With incandescent gas lighting, whether intensified or at ordinary pressures, the heat of combustion is insignificant in comparison with the lighting effect. The business difficulty lies in getting the people interested to see this. Gas companies have as a rule taken so little interest in the actual use of gas by their customers, that the attempt to get into confidential relations with them now, with a pushing rival in the field, very often fails. But the logic of facts is all on the side of gas; and the pressure of the economical consideration is bound to tell in the long run.

Many public halls and churches, and most large shops and warehouses, simply cannot afford a lighting bill several times higher than is absolutely necessary to enable the working to be carried on. If they are prevailed upon to try electric light for a time, they will return to incandescent gas after they have had a chastening experience of the only alternative; but it is preferable that they should not make this excursion at all. With the object of retaining this branch of custom, gas engineers should be able to fight it out with the electricians on the point of ventilation. The point is, briefly, that where any special provision for ventilation is required at all, it is needed as much with incandescent electric lighting as with incandescent gas. That is the position. It is no question of more or less need, but absolutely of the same hygienic requirement. This conclusion, of course, flows from the consideration that interiors are lit in order to be occupied with comfort and health by people, which is a reflection the electricians find it convenient to ignore. "Our light," they say, "does not use up the air." No; but the people do, and it is they who need a proper air supply

Once get it agreed that an occupied interior needs proper ventilation, however lighted, and the rest is a matter of mechanical engineering. Let nobody run away with the notion that the satisfactory ventilation of a church, or a long shop, is an easy job. On the contrary, it is extremely troublesome, and very difficult; for which reason it is too often left alone. The owners of the establishments that most need ventilation shirk the provision, usually by the adoption of various and sundry palliatives. Electric lighting is one expedient; forbidding smoking is another. But if a hygienic inspection were made of the atmosphere (say) of the inmost recesses of a busy unventilated draper's shop in any town three hours after the electric light had been switched on, the result would be appalling to those who would persuade themselves that, because atmospheric impurity cannot be seen, it does not exist. And anyone who next morning enters a church much used on Sunday, needs no chemical analysis to inform him that there is something very wrong with the atmosphere.

For practical purposes, the efficient ventilation of an interior means that its atmosphere shall be changed with sufficient frequency to preserve a tolerable degree of freshness. There would be little difficulty about securing this desideratum, but for the equally binding requirement that the work must be done insensibly, whether as regards the movement of the air or its temperature. This obligation makes all the difference. Hence follows the necessity of combining ventilation with warming. By whatsoever arrangement the changing of the air is effected, the correction of the inflowing air to the desired temperature whenever it happens to be too cold, must be provided for. It is obviously impossible to discuss here the multiplicity of the problems of ventilation that, with knowledge and ingenuity, it is possible to solve more or less completely for practical purposes by relying upon what is called natural ventilation. We speak of solving these problems partially, and regard this qualification as important; for it is one of the commonest and greatest mistakes in ventilation to overdo it. Snugness in cold weather is a highly-prized quality of all interiors; and where it has been jeopardized by too liberal ventilation (installed by someone who does not live in the place) it is usual to find the air openings pasted over, and intended air-valves broken down.

Experience shows, however, that for many of the most pressing cases of bad ventilation, mechanical means of moving the air are indispensable. It has been found that most existing large buildings, where provision has been made for moving the air by the direct application of heat—whether of steam, gas, or coal—to expand the effluent air in rising eduction conduits, do not give uniform satisfaction in this respect. Such a means of moving air is to be ranked as old-fashioned; and it is far more costly than mechanical driving or exhaustion. It does not matter to a fan or blower whether it is driving or exhausting; but it makes a good deal of difference to the scheme of mechanical ventilation, by reason of the connection with warming. Consequently, ventilating engineers are in the habit of distinguishing systems of ventilation as the "plenum" or the "vacuum" systems, accordingly as the air is driven in or exhausted out of the interior in question. This distinction must not be pushed pedantically. In every-day experience, in the English climate, it is found more convenient to blow fresh air into a hall, leaving means for its escape after it has served its object.

Where an apartment, such as a church, can be ventilated directly by the application of a fan to its particular needs, this is the most expedient treatment to adopt, as has been proved in the Law Courts, and in the Committee Rooms of the Houses of Parliament. There are many halls where the obvious working of a fan in the window is not objectionable; but where this cannot be borne with, a fan-chamber with conduits must be provided. It is the same when collective ventilation has to be resorted to. In large buildings containing many rooms, the multiplication of fans would mean unnecessary expense and after-maintenance. Here a good gas-engine, with a blower drawing air from the roof, would answer the purpose. Positive blowers are unsuitable for this class of work, as there is no air circulation through them if the machinery breaks down. For small, independent room fans, electric driving is most convenient, although a small hot-air engine, working with gas, will serve instead. A very serious difficulty in many cases arises in connection with the warming of the inflowing air. This is best discharged into the interior at about the height of the occupiers' heads, and should sweep right through or across the enclosed space to the outlets. In order to have the necessary velocity of travel, the air should be driven in with considerable force—preferably through converging conical nozzles—exactly like fire-nozzles.

Where the contrary form is given to the inlets, the air enters without velocity, and simply falls down in a shower immediately inside the walls. Of course, in order to prevent the feeling of a cold draught of air, it must be warmed sufficiently—say, to 56°. This cannot usually be done from the hot-water heating apparatus of the building, which is not commonly carried so high as the fresh-air inlets ought to be placed. Something might easily be done in this way by gas-heating arrangements, in which the air should pass in contact with plates or pipes warmed locally by a gas-flame. A fresh-air supply of 15 cubic feet per minute per head is a very fair allowance for most public buildings, including schools. The specific heat of air at constant pressure is about 0·24, which is equivalent to 0·01817 unit per cubic foot. The number of units of heat necessary to warm 15 cubic feet from (say) 32° to 54°, or by 22°, is consequently $15 \times 22 \times 0{\cdot}01817 = 6$ nearly. Assuming the calorific power of common coal gas to be 600 units per cubic foot, and that an air-warming stove would have an efficiency of 50 per cent., this means that a stove burning 1 cubic foot of gas a minute would warm the air for fifty people, and might possibly do even higher duty. Inasmuch as the other heating apparatus might be shut down as soon as this warmed air supply was started the cost of the latter would not be great, even during a frost, Usually, in our climate, the demand would be less than this. It would be interesting to hear of such an arrangement being tried.

ELECTRIC LIGHTING MEMORANDA.

The Defence of the Poplar Borough Council—The Demand of Public Opinion—Selling Electric Power under Cost Price—The Fallacy of "Day Load."

THE defence of the Poplar Borough Council's electricity supply undertaking has been given anonymously in the "Municipal Journal;" and although the statement is not authoritative, it is sufficiently well-informed to be taken seriously, which is after all the main thing in controversy. One gets so tired of the childish official complaint of criticism as being "irresponsible," when all that is meant is that it is distasteful, that the attraction of a good attack or defence which does not happen to be signed, is positively enhanced by its freedom from the personal factor. It has been observed in this column that the impeachment of the Poplar Borough venture originally appeared in a non-technical newspaper—the "Daily Express." The reply makes a pretence of being categorical, but is not completely so. The first statement on both sides is agreed—that whereas the electrician originally called in by the old Vestry, in 1897, advised that a fairly good system of electric lighting could be secured for £45,000, yielding a substantial profit, the Borough Council have actually been let in for an outlay of £174,000, which so far has only made a loss. Nobody acquainted with Vestrydom would believe for an instant, on any pretence, that if the Poplar Vestry had known what they were being committed to in the way of capital expenditure, they would have moved in the matter at all.

With regard to the revenue and profit, it is admitted that a public lighting bill, which for the December quarter used to be about £1100, for gas in the old style, was raised for the last December quarter to £2755. Out of this, £1041 is still for gas-lamps not discontinued, and the balance of £1713 is entirely for electric lighting intended to furnish work for the electric lighting undertaking. It is claimed that the cost of maintaining 155 arc lamps in the Isle of Dogs is only £19 16s. per annum, which makes those installed elsewhere look very dear. It is admitted, even so, that the increased expense of lighting the Isle of Dogs over the old gas-rate, amounts to £2535 a year. The excuse is offered that "the decision to adopt this improvement was the direct result of various indignation meetings called by the burgesses (?) in the Isle of Dogs district to protest against the inadequacy of the old gas lighting arrangements." How sweetly reasonable is this! Do we not all know those indignation meetings, held at the "Cock and Bottle," or some such political centre! And the "burgesses" who compose them—how deep would they have to dip into their pockets to find any substantial share of the increased expense which they wanted put upon the rates? If the Poplar Borough Council are so amenable to "public opinion" that they will spend another £2500 a year at any time to oblige a meeting of "burgesses," there are a few professional gentlemen to be heard of in the neighbourhood of any "house of call" in the Isle of Dogs, who, for a reasonable expenditure in liquid refreshment, would undertake to manufacture the requisite force of public opinion on the shortest notice.

The gravest objection, however, is that whereas the Poplar Borough Council were advised, and believed, that they could generate electricity for 3d. per unit, including everything, and framed their charges accordingly, it actually costs over 5d. per unit; so that every sale for less than this price is a dead loss, which must be borne by the rates. The cost is admitted; but it is explained that, owing to the business being so young, the output of the machinery was comparatively small. The point is, however, that in order to find employment for the machinery already purchased, the Council are bidding for power customers at a figure which can never pay, on whatever scale the business is done. It is conceded, for example, that "a special rate of 1½d. per unit is offered to large power consumers of upwards of 250,000 units per annum," which terms have been graciously accepted by many users of power in the district, "and the prospects of success have by far exceeded the most sanguine expectations." Certainly, it cannot have entered into the expectations of the Millwall Docks Company and others that the Borough Council would be foolish enough to offer them electric power for less than they could buy it, or its equivalent, from any other quarter. If these highly-rated firms are able in this way to get a little of their increased rating back, so much the better for them. The Commercial Gas Company may even find it advantageous to work their coal-cranes on the same principle, which is the only gleam of comfort they will be able to detect in the prospect.

But why, or in what sense, the Poplar Borough Council are to be congratulated upon securing this class of business passes a reasonable man's comprehension. It is the idlest of pretences to say that this electric power is what can be generated at the borough works during the daytime, and "can therefore be looked on as a bye-product." This is a palpable absurdity. If the Council mean to put into their power-supply contracts the proviso that they are not to be compellable to supply during periods when the machinery is wanted for the generation of lighting currents, then they will not find many customers for the service. It is of the essence of a power connection that it shall not be subject to interruption during working hours. Who is going to buy electric power, at any price, subject to the risk of having his cranes or his machine tools laid idle at any moment—and certainly the instant a fog happens along? There has never yet been an electric-lighting station, run upon business lines, which has been able to find a really desirable "daylight load." Even the Electric Cab Company could not be bothered to take current on the only terms on which one of the London Electric Lighting Companies were willing to serve them with "bye-product" electricity. And then, the price was 3d. per unit. No; the Poplar Borough Council will never be able to make both ends meet at their present prices for current, notwithstanding their willingness to charge the public lighting account with £3000 a year extra in aid. It is useless to claim anything to the credit of the Council; these charges are the most favourable (to consumers) in all London. If the electricity were given away, the users would like it still more—provided they were not considerable ratepayers. If that is the ideal, let it be owned up to at once. But it has nowhere been conceded as among the fitting and proper duties of a municipal authority to supply electricity at less than cost price, charging the difference upon the rates. It is very generally done, of course, upon one pretence, or under one cloak, or another; but Poplar bids fair to be the first place where the naked issue is likely to be brought into the light of day.

SULPHATE OF AMMONIA IN AGRICULTURE.

THE Sulphate of Ammonia Committee continue, in an unostentatious way, their excellent work on behalf of the sulphate of ammonia producers of the country. To prove its superiority to other types of manures is of the foremost of their aims; and in this connection they are doing very substantial work, judging by the last report of their expert, Mr. John Hunter. This report is dated Dec. 26; and it contains quite a mass of tabular information in reference to competitive agricultural experiments. When the Committee's experiments were inaugurated, those who tilled the land were told that rich blessings would result from the use of sulphate of ammonia in comparison with other purely nitrogenous manures. "Larger crops, better quality of crops, better feeding properties, and better keeping qualities," were among the excellencies then attributed to the use of sulphate. Since that statement was first made, it may be safely said each season has brought nothing but confirmation; and this fresh report of Mr. Hunter adds its weight of corroboration.

We may take, as an example, two special grain experiments in Scotland, where sulphate of ammonia and nitrate of soda were very carefully compared. In the first trial, 1 cwt. of sulphate of ammonia was applied to an acre of land; and the produce was 17 cwt. 3 qr. 20 lbs. of oats and 1 ton 10 cwt. of straw. Nitrate of soda to the amount of 1¼ cwt., also applied to an acre of land, gave a return of 16 cwt. 0 qr. 12 lbs. of grain, and 1 ton. 6 cwt. of straw. In addition to comparing sulphate of ammonia and nitrate of soda alone, the experiment was extended by adding 2 cwt. of kainit per acre to a second sulphate of ammonia plot, and by leaving another plot unmanured. The result was that the 1 cwt. of sulphate and the 2 cwt. of kainit per acre returned 18 cwt. 2 qr. 15 lbs. of grain, and 1 ton 12 cwt. of straw; and the unmanured acre yielded 16 cwt. 2 qr. 12 lbs. of grain, and 1 ton 6 cwt. of straw. These latter results are of the utmost interest in so far as they prove that the addition of a potash salt to sulphate of ammonia gives the increase which has all along been anticipated and pressed by every report the Sulphate of Ammonia Committee have issued. They further show, what has often been shown before, that the application of nitrate of soda frequently results in damage to crops, and that it is not suited for general application to the grain crops of the country—the unmanured plot presenting a better production of grain by 2 qr. than the plot which received 1¼ cwt. of nitrate per acre.

In the second set of trials referred to, the results are, if anything, more interesting than those first alluded to. Taking the nitrate of soda in this case, we find that 1¼ cwt. per acre was applied, and that the straw was equal to 1 ton 18 cwt. per acre. The grain results were as follows:—

	Cwt.	Qr.	Lbs.			
First grain . . .	10	0	24	per acre, weighing	36½	lbs. per bushel.
Second grain . .	2	2	8	,, ,,	35	,, ,,
Third grain . . .	1	3	16	,, ,,	35½	,, ,,
Total grain per acre	14	2	20			

It should be explained that the second and third grain may be regarded as small corn or tailings—that is to say, the lower grades of grain obtained from the thrashing-out of the whole grain grown on the nitrate plot. As to the comparative figures for sulphate of ammonia, it is shown that 1 cwt. per acre was used; and the weight of straw per acre was 1 ton 11 cwt. Giving the grain figures in a corresponding form to the above, we have:—

	Cwt.	Qr.	Lbs.			
First grain . . .	13	2	0	per acre, weighing	38	lbs. per bushel.
Second grain . .	3	2	8	,, ,,	37	,, ,,
Third grain . . .	2	0	8	,, ,,	36½	,, ,,
Total grain per acre	19	0	16			

Now it will be observed that the highest natural weight of the grain grown with nitrate is 36½ lbs. per bushel, and that there is 10 cwt. 0 qr. 24 lbs. of this quality. On the other hand, sulphate of ammonia gives 13 cwt. 2 qr. 38 lbs. per bushel, and the lowest of the sulphate of ammonia corn is as good as the highest of the nitrate-grown corn. We have here the remarkable fact that—even detracting from the superior merits of the sulphate of

ammonia grown grain, and presuming it all to be as bad as the best of the nitrate grown grain—the acre of sulphate of ammonia treated land gave 19 cwt. 0 qr. 16 lbs. of 36½ lbs. and over of grain per bushel, as against for nitrate of soda only 10 cwt. 0 qr. 24 lbs. of 36½ lbs. of grain to the bushel. These grain experiments are of the greatest value to the agriculturists of Britain. They have been repeated (during the season reported upon by Mr. Hunter) in at least four counties, and will serve to illustrate as many variations of soil and climate. It is, however, regrettable that, in consequence of unavoidable delays in thrashing, the results are not yet available.

We cannot draw from the report to any extent in connection with the experiments on different classes of land produce. The same tale runs through the trials; the superiority of sulphate of ammonia being absolute everywhere. In the class devoted to yellow turnips, there is some striking evidence as to the increased production resulting from the addition of sulphate of ammonia to the usual manuring on plots of land, in comparison with other plots on which only the usual manuring had taken place. Each two plots of ground were as nearly as possible identical. In two cases 1½ cwt. of sulphate was added to the manuring of each plot; the grain, in comparison with the corresponding plots not treated by sulphate, being 6 tons 10 cwt. and 4 tons 16 cwt. respectively. On two other plots, ½ cwt. of sulphate was applied in addition to the ordinary manuring. The increase in yield—again compared with plots not treated by sulphate—was 10 tons 3 cwt. and 8 tons 13 cwt. Deducting the value of the sulphate of ammonia at the rate of 12s. per cwt., and taking the turnips as worth 20s. per ton, we have increased profits from these plots of £5 12s., £3 18s., £9 17s., and £8 7s. These results are vouched for by three agriculturists of the highest repute in Banffshire. Yet the farmers are slow to appreciate!

Coming to the class devoted to swedes, it is found that members of the Malton (Yorks.) Agricultural Society have carried out some very painstaking experiments. By the addition of 1 cwt., 1¾ cwt., and 1 cwt. of sulphate to the usual manuring, they have obtained increases in yield of 2 tons 7 cwt., 10 tons 5 cwt., and 8 tons 9 cwt. respectively. These are large increases from comparatively small costs—taking the price of the sulphate, as before, at 12s. per cwt. In all the classes, similar results are recorded; and there is not even a suggestion of anything unfavourable to sulphate of ammonia among the hundreds of experiments carried out during the season. "It is safe to say," remarks Mr. Hunter, "that there is no other manure of its class on the market which could, under any conceivable conditions, come through the same ordeal with such an untarnished reputation."

In another part of the report, we find Mr. Hunter having a little straight talk with the agriculturists of this country. The total quantity of sulphate of ammonia manufactured in Britain in 1900 was about 210,000 tons. Of this quantity no less than 145,000 tons were exported to Europe, America, and the Colonies. The agriculturists of those Continents have followed the teachings of the Government supported experimental stations, and the technical educational systems of those Continents have prepared their agriculturists for the acceptance of the truths of science realized from exact experiments. The result is that, while in 1890 those countries absorbed only 86,000 tons of Britain's total production of sulphate of ammonia, in 1900 they had taken no less than 145,000 tons, or about three-fourths of our total production. Continental growers of barley, &c., require quantity in the crops they grow. They must also have quality, in order to hold their own with us in our markets; and, as a rule (Mr. Hunter assures us, and brewers declare without hesitation), they beat us.

Now let us follow our informant in this matter. These Continental growers have to pay at least the same price for sulphate of ammonia as home farmers. But they have in addition to pay freight; and they must also have considerably greater charges for landing, transit, &c., from sea to land. Yet under all these disadvantages they absorb about three-fourths of the sulphate of ammonia this country can produce, while our farmers are broadcasting the equally costly nitrate of soda (more costly if the price per ton is calculated from the units of nitrogen in each); and we are undoubtedly beaten in the contest. Let the farmers of Britain realize what their foreign competitors are doing; let them realize what are the facts taught us by those competitors; let them further take more to heart the results obtained by those experimentalists in our own country, whom they can trust, and (predicts Mr. Hunter) there will be an immediate cessation of this exportation of so valuable, and by Continentalists valued, product of our own. As the report and the tabulated results of the experiments show, agriculturists are themselves, in all parts of the country, rapidly establishing, by practical experiments, the truth of the materially greater benefits to be derived by using sulphate of ammonia as compared with any other purely nitrogenous manure; and this being so, we may ere long see that large exportation on the decline and the home demand for the gas-works product on the increase.

This dip into Mr. Hunter's report shows that it is replete with interesting matter, of which not only agriculturists but the producers of sulphate of ammonia should have knowledge. A gas manager and engineer is expected to be able to advise as to the best methods of using the chief product of his works; and, while we do not suggest that he should know all about manure dressings and plant culture, he can, by means of such reports as the one before us, prepare himself with a ready word of commendation for one of the important bye-products of his manufacture.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 504.)

THE Stock Exchange had a dull time last week, which several influential factors combined to bring about. Chief among these was a strong reaction, not altogether free from a feeling of apprehension, after the recent immoderate speculation. The last settlement showed how largely the thing had been overdone; and even the most pushing ones are likely to keep steadier for a little while. Prices nearly all round are weaker; and Consols are almost the only conspicuous exception, and show an advance. In the Money Market, the position was firm. There was a good demand, and rates for short loans and discount were steady. Business in the Gas Market showed a considerable advance in point of activity over what has been the average run for the last few weeks; but it must be borne in mind that they were exceptionally quiet. Changes in quotation were neither numerous nor considerable in degree; and though not uniformly in the upward direction, the majority of them moved that way. Although reductions are apparent in two leading issues, yet the generally prevailing tendency is firm, with a disposition to rise. Except in some lines, there does not appear to be a plethora of stock in the market, and the price is apt to jump up at a moderate inquiry. In Gaslight issues, there was a largely increased amount of dealing in the ordinary. It opened with a "special" bargain at 93—a low figure, and then touched 95. But next day it grew still weaker, and gradually declined, by easy stages, to a mark of 91¼ on Saturday; the quotation dropping a couple of points. The Company's secured issues held up firmly; and the preference even gained a point. Hardly anything was done in South Metropolitans, which may be noted as steady and unchanged. Two or three bargains were marked in Commercials at good figures; but business was very limited. Transactions in the Suburban and Provincial group were at the lowest ebb, and there was no movement in the London market; but on the local Exchange there was an advance in Newcastle. In the Continental companies, business was of the slightest proportions; only three or four transactions being the sum total of the week. Imperial was weak, and the quotation fell a point. Tuscan debentures advanced. Among the remoter undertakings, the only movement was in River Plate. In the Water Companies, there was a further reaction from the late big advance in prices, but not to any great extent. Some uneasiness is felt as to the treatment of the Companies in the Government Bill, and the market is rather sensitive. But New River had a slight rise.

The daily operations were: Gas opened more active on Monday, with good prices, except in Gaslight ordinary; but quotations did not move. In Water, New River rose 2½; but Lambeth 7½ per cent. fell 5. Tuesday was rather quieter, and weaker. Gaslight ordinary and Imperial fell 1 each; but Tuscan debentures rose 2. Wednesday was very quiet. Gaslight preference rose 1. In Water, Lambeth fell 2. Thursday was another quiet day, and Gaslight ordinary fell 1. East London Water receded 1½. Friday was more active, mostly in Gaslights. River Plate rose ¼. Gaslight ordinary was again active on Saturday, but nothing else; and quotations closed unchanged.

Midland Association of Gas Managers.—As already announced, the annual general meeting of this Association will be held at the Grand Hotel, Birmingham, next Thursday, under the presidency of Mr. Charles Hunt. According to the circular issued by the Hon. Secretary (Mr. A. Cooke, of Oldbury), in addition to the reception of the report and the statement of accounts, the election of new members, and the delivery of the Inaugural Address, a discussion on "Inclined Retorts" will be opened by Mr. H. P. Maybury, of Malvern.

The Legal Relations between Gas Supply Undertakings and Consumers.—The last section of the concluding portion of this article as published in last week's "JOURNAL"—namely, "Consumer a Mortgagor making Default"—was an addition by the author after the rest of the matter had been put in type; and, by inadvertence, in making up the "JOURNAL," it was not taken to its proper place, which should have been after the section dealing with "Composition or Scheme of Arrangement." The final words of the article, therefore, which indicate that there might be a further instalment, of course, refer to the section relating to a "Receiver for Debenture Holders."

Institution of Mechanical Engineers.—The annual report of the Council was presented at the general meeting of the members on Friday evening. The gratifying statement was made that at the end of 1901, the number in all classes on the roll of the Institution was 3491, as compared with 3165 at the end of the previous year, showing a net gain of 326. During the year there were added to the register 426 names; and the total deductions were 100, made up of 36 deceases during 1900, 40 resignations which took effect on Jan. 1, 1901, and 24 removals. Upon the work of the Gas-Engine Research Committee, it is mentioned that the Council have agreed to provide during the coming year instruments for trials with a large experimental gas-engine which Professor Burstall is designing to form part of the power and lighting plant in connection with the new Birmingham University Buildings. The Committee have been strengthened by the additions of Mr. Dugald Clerk and Mr. Herbert A. Humphrey.

PERSONAL.

Mr. W. A. M'Intosh Valon, J.P.

At a Meeting of the Gas and Water Accounts Committee of the Ramsgate Corporation, held on Monday last week, Mr. Valon made known to the Committee that it was his intention to resign his position as Resident Engineer to the Gas and Water Departments at the end of the current financial year. He intimated to the Committee that this had been his intention some time ago, but he had (by request of the Chairman) continued his services, in order that the improvement works which were being carried out, both at the gas and water works, might approach completion. He now felt, however, that the time had arrived when he might carry out this intention. The notification would date from the 25th of March, to take effect in September.

We may say that, although Mr. Valon is to resign the responsibility for active management of the Ramsgate Gas and Water Departments, he in no way separates himself from continued interest in his work in Thanet. He is, as is well known, the Consulting Engineer to the Broadstairs District Council, as well as Engineer to the Westgate Estate; and he has responsible charge of the works of the Gas Company supplying Westgate and Birchington, as well as the Water Company who supply the same district. He is also—jointly with Mr. Arthur Valon—the Engineer to the Minster and Stourmouth District Councils, and is now erecting the bridge across the River Stour to connect Stourmouth and the Isle of Thanet, which is mid-way between Canterbury and Minster.

The cause of Mr. Valon's resignation is the fact that his consulting practice prohibits him devoting the time necessary for any detailed supervision of the Ramsgate Gas and Water Departments. Messrs. Valon will now transfer the whole of their office staff to London.

Mr. A. W. Oke, of Southampton, has been elected a Director of the Ryde Gas Company, to fill the vacancy caused by the death of Mr. Camille Villetard.

Mr. Richard T. Surtees, of Hexham-on-Tyne, has been appointed Water Engineer to the Newton-in-Makerfield Urban District Council, at a salary of £250 per annum.

At the last half-yearly meeting of the Brompton, Chatham, &c., Water Company, Mr. G. G. Catt, the Secretary, was thanked and presented with 100 guineas for extra work undertaken by him in connection with arbitration proceedings in which the Company have recently been interested.

Mr. Harold Baker, Gas Engineer and Manager of the Cockermouth District Council, has been appointed to a similar position with the High Wycombe Gas Company, in succession to Mr. J. F. Wicks. Since he went to Cockermouth, in 1896, the works under his charge have undergone considerable extension and improvement, and the sale of gas has increased 30 per cent.

Heating by Gas Radiators.—For some time past a considerable number of complaints have been made about the want of heating apparatus at the St. Andrews Town Hall. This defect has now been remedied by the introduction of five gas radiators manufactured by Messrs. John Wright and Co.—one being placed in each window. The new apparatus, which has been fitted up under the superintendence of Mr. R. Hall, the Manager of the St. Andrews Gas Company, has been tested, with most satisfactory results; the temperature being raised from 32° to 46° Fahr. in 2½ hours, at the small cost of 7½d.

Manchester District Institution of Gas Engineers.—The 32nd annual meeting of this Institution will be held at the Mosley Hotel, Piccadilly, Manchester, next Saturday. We learn from the circular issued by the Hon. Secretary (Mr. J. Wilkinson, of Sheffield) that the business will include the admission of four new members, the reception of the report of the Committee and the financial statement, and the election of the Vice-Presidents and office-bearers for the current year. The new President (Mr. A. Graham, of Mansfield) will deliver his Inaugural Address; Mr. E. A. Hudson, of Normanton, will read the paper on "The Control of Chimney Draught," prepared by him for the last meeting; and Mr. W. Whatmough, of Heywood, will contribute a paper on "The Disposal of Coke."

Patent Office Library Handbooks.—Another of the useful series of handbooks from the Patent Office Library has just been issued in the shape of a "Class List and Index of the Periodical Publications." It is divided into three sections: (1) An abstract of the classification adopted; (2) a classified catalogue; and (3) a brief alphabetical title index. The list comprises 2563 works, distributed under 356 classes, and representing some 39,682 volumes, of which more than two-thirds are placed on the first gallery in the new library. This gallery is accessible to the public; and admission to the second, which contains certain sections of the periodical collection less frequently consulted, is obtainable by ticket. In the new building, three rows of tables on the ground floor are set apart for the current numbers of periodicals; and between the rows are placed parallel dwarf presses containing the boxes in which the numbers are stored till the time comes for binding them.

COMMUNICATED ARTICLES.

RETORT-HOUSE WORKING IN BERLIN.

By Edward Drory,

Chief Engineer at Berlin of the Imperial Continental Gas Association.

I have followed very closely the interesting discussion that has been going on in the columns of the "Journal" during the last few weeks, on the subject of "Inclined Retorts *v.* Horizontals." Having been one of the pioneers of the inclined system on the Continent, and having since followed its development, I was very much surprised to read the recent article on the "Trend of Gas Invention," wherein it is stated that English engineers have left Continental practice in the matter of inclined retorts far behind. Now I think this discussion is a proof of the contrary being the fact. The matter was settled more than three years ago in Germany, Austria-Hungary, Switzerland, &c., and nobody now questions the superiority of the inclined system over any other.

In this connection, I am sending herewith a table which will, I think, be of interest to your readers, as I have five different systems at work, and the same rate of wages is paid in every case. The table is made up on the result of our actual workings; and the figures are, therefore, absolutely reliable. I think the publicity of the table will tend to solve any doubts in England as to where the advantage lies.

Explanatory Remarks on the Table.

From the table can be clearly seen the advantages of the inclined retort system, from every standpoint, over the different other systems employed at the Berlin station; and, the rate of wages with 12-hour shifts being in every case practically the same, the comparison is a very good one.

The 46 settings at the Gitschiner Strasse works have been taken as the basis of comparison, as these have all been at work during the winter months—26 of them having been put into action in 1897, and 20 in 1900. They were all built in the existing retort-house. In the new works at Mariendorf, recently opened, a retort-house has been built specially adapted to the inclined system with better ventilation, &c. This, coupled with the De Brouwer coke-conveyor, renders the work of the stokers so much more comfortable that, whereas at the Gitschiner Strasse works six stokers are required for nine furnaces, or five stokers for seven furnaces, at Mariendorf only five men are required for eight furnaces, or six men less for 46 furnaces. As no men are required for quenching and wheeling the coke outside the house, the total reduction in the number of men would be 22; one man being employed for every 7·32 tons of coal carbonized per day, as against one for every 5·7 tons at the Gitschiner Strasse works—being an economy of about 2d. per ton. This would, of course, not represent the total economy to be realized by means of the coke-conveyor, as the labour saved in conveying the coke to the coke-breaker, or in stacking it (which would perhaps amount to another 2d. or 3d. per ton according to local circumstances), has not been taken into account—this being booked under coke manipulation.

Now to compare the workings of the different systems used at the other works with the inclined retort system at the Gitschiner Strasse works, where there are no coal or coke conveyors to take into consideration. At the Schöneberg works, fitted with Arrol-Foulis stoking machinery, 86 furnaces would be required to carbonize 10,000 tons of coal in 17½ days, as against 80 furnaces with hand-stoking. This extra number is due to the fact that with machine stoking the charge is slightly reduced for the convenience of drawing the coke; the reduction amounting to about 1 cwt. per retort per day. The charges are made every 4 h. 48 min. The area covered by the retort-house for these 86 furnaces would be 11,951 square feet more than at the Gitschiner Strasse works, and 12,454 square feet more than at the new Mariendorf works; this being another point in favour of the inclined system.

In the number of pipe-jumpers, lidmen, &c., the inclined system compares favourably with the horizontals and machine stoking at Schöneberg, as stopped ascension pipes are comparatively rare; whereas in the latter case they are much more frequent, and require a large number of extra hands. The coke men included under retort-house labour are simply those required for quenching the coke, and wheeling it to the yard outside the house. In this respect, the number in the Holzmarkt Strasse works compares favourably with that at Schöneberg, as, owing to the fact of there being no stage-floor and only seven retorts per furnace, the stokers partly quench the coke, and wheel it outside themselves.

With regard to the size of the coals for inclined retorts, there is no difficulty whatever. With my system of hoppers for charging the retorts, any size can be used—either fine, broken lump coal, or the two mixed together, and even cannel; the coal lying in a perfectly even layer from the bottom to the top of the retort. The charges are always well worked off; the average production of gas per ton being 10,600 cubic feet, and per retort 14,900 cubic feet. The coals used are English, Silesian, and a small quantity of Westphalian. As regards creeping, this has only been found to take place with two sorts of Durham coals. The creeping, however, is not a great drawback. It has no effect on the production of gas, which remains in every case the same; and this

COST OF WAGES FOR CARBONIZING 10,000 TONS OF COAL IN A GIVEN TIME (17½ DAYS),

UNDER THE FIVE DIFFERENT SYSTEMS EMPLOYED AT THE BERLIN STATION OF THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

GITSCHINERSTRASSE WORKS.	MARIENDORF WORKS.	SCHÖNEBERG WORKS.		HOLZMARKTSTRASSE WORKS.
Inclined Retorts.	Inclined Retorts with Coal Conveyors and De Brouwer's Hot-Coke Conveyors.	Hasse-Didier Generator Furnaces with Arrol-Foulis Stoking Machinery.	Hasse-Didier Generator Furnaces with Hand Stoking.	Ordinary Fire-bar Furnaces with Hand Stoking.
The existing 46 settings of 9's = 414 retorts, would carbonize 10,000 tons in 17½ days.	46 settings of 9's = 414 retorts, would be required to carbonize 10,000 tons in 17½ days.	86 settings of 9's = 774 retorts, would be required to carbonize 10,000 tons in 17½ days.	80 settings of 9's = 720 retorts, would be required to carbonize 10,000 tons in 17½ days.	118 settings of 7's = 826 retorts, would be required to carbonize 10,000 tons in 17½ days.
Internal dimensions of retorts = 15 ft. 9 in. × 21 in. × 15 in.	Internal dimensions of retorts = 15 ft. 9 in. × 21 in. × 15 in.	Internal dimensions of retorts = 9 ft. 6 in. × 21 in. × 13½ in.	Internal dimensions of retorts = 9 ft. 6 in. × 21 in. × 13½ in.	Internal dimensions of retorts = 8 ft. 6 in. × 21 in. × 13½ in.
Coal carbonized—	Coal carbonized—	Coal carbonized—	Coal carbonized—	Coal carbonized—
Per retort per day . . . . . 1·38 tons.	Per retort per day . . . . . 1·38 tons.	Per retort per day . . . . . 0·74 tons.	Per retort per day . . . . . 0·79 tons.	Per retort per day . . . . . 0·69 tons.
Per man employed in retort-house per day . . . . . 5·7 tons.	Per man employed in retort-house per day . . . . . 7·32 tons.	Per man employed in retort-house per day . . . . . 3·44 tons.	Per man employed in retort-house per day . . . . . 2·52 tons.	Per man employed in retort-house per day . . . . . 2·14 tons.
Per square foot of area covered by retort-house per day . . . . . 32·3 lbs.	Per square foot of area covered by retort-house per day . . . . . 32·7 lbs.	Per square foot of area covered by retort-house per day . . . . . 24·8 lbs.	Per square foot of area covered by retort-house per day . . . . . 26·4 lbs.	Per square foot of area covered by retort-house per day . . . . . 26·4 lbs.
Total cost of retort-house labour £441 13 0·0	Total cost of retort-house labour £356 17 0·00	Total cost of retort-house labour £641 3 0·0	Total cost of retort-house labour £1004 1 0·0	Total cost of retort-house labour £1226 12 0·0
Cost per ton . . . . . 0 0 10·6	Cost per ton . . . . . 0 0 8·56	Cost per ton . . . . . 0 1 3·4	Cost per ton . . . . . 0 2 0·1	Cost per ton . . . . . 0 2 5·4
Do. per lineal foot of retort . . 0 1 4·2	Do. per lineal foot of retort . . 0 1 1·10	Do. per lineal foot of retort . . 0 1 8·9	Do. per lineal foot of retort . 0 2 11·2	Do. per lineal foot of retort . . 0 3 5·9
Do. per square foot of area . . 0 0 2·7	Do. per square foot of area . . 0 0 2·20	Do. per square foot of area. . . 0 0 3·0	Do. per square foot of area . 0 0 5·0	Do. per square foot of area . . 0 0 6·1
Men included under Retort-House Labour.	Men included under Retort-House Labour.	Men included under Retort-House Labour.	Men included under Retort-House Labour.	Men included under Retort-House Labour.
2 foremen at 5s. 10·5d. . . . = £0 11 9	2 foremen at 5s. 10·5d. . . . = £0 11 9	4 foremen at 5s. 10·5d. . . . = £1 3 6	4 foremen at 5s. 10·5d. . . . = £1 3 6	4 foremen at 5s. 10·5d. . . . = £1 3 6
64 stokers at 5s. 4·6d. 17 5 0	58 stokers at 5s. 4·6d. 15 12 9	20 machine hands at 5s. 4·6d. . 5 7 10	160 stokers at 5s. 4·6d. . . . 43 2 9	236 stokers at 5s. 4·6d. . . . 63 12 6
5 firemen at 5s 4·6d. 1 6 11	5 firemen at 5s. 4·6d. 1 6 11	30 helpers at 4s. 5·0d. . . . 6 12 4	10 firemen at 5s. 4·6d. . . . 2 13 10	16 cokemen at 3s. 11·0d. . . . 3 2 9
22 cokemen at 4s. 2·0d. . . . 4 11 8	4 pipe-jumpers, lidmen, &c., at 4s. 2·0d. 0 16 8	10 firemen at 5s. 4·6d. . . . 2 13 10	40 cokemen at 3s. 11·0d. . . . 7 16 11	11 coalmen at 3s. 11·0d. . . . 2 3 1
4 pipe-jumpers, lidmen, &c., at 4s. 2·0d. 0 16 8	3 engine-men for coke conveyors at 4s. 5·0d. 0 13 3	42 cokemen at 3s. 11·0d. . . . 8 4 9	10 pipe-jumpers, lidmen, &c., at 4s. 2·0d. 2 1 8	
2 coalmen at 4s. 2·0d 0 8 4	3 engine and elevator men for coal at 4s. 5·0d.. . . . 0 13 3	56 pipe-jumpers, lidmen, &c., at 4s. 2·0d. 11 13 4	2 machine men for lifts at 4s. 5·0d. 0 8 10	
1 Engine and elevator man at 4s. 5·0d. 0 4 5	3 coal conveyor men at 4s. 5·0d. 0 13 3	2 engine and elevator men at 4s. 5·0d. 0 8 10		
		2 machinists for hydraulic pumps at 4s. 2·0d. 0 8 4		
100 men in 24 hours . . . . . = £25 4 9	78 men in 24 hours . . . . . = £20 7 10	166 men in 24 hours. . . . . = £36 12 9	226 men in 24 hours. . . . . = £57 7 6	267 men in 24 hours. . . . . = £70 1 10

SUMMARY.

Saving in Retort-House Labour with Inclined Retorts, as per Preceding Table.

	Less Number of Men Required.	Saving per 10,000 Tons of Coal Carbonized.	Saving per Ton.
Inclined retorts at Gitschinerstrasse over horizontals with hydraulic stoking machinery at Schöneberg	66 ..	£199 10 0 ..	4·80d.
,, ,, ,, ,, ,, ,, hand stoking at Schöneberg	126 ..	562 8 0 ..	13·50
,, ,, ,, ,, ,, ,, ,, Holzmarktstrasse.	167 ..	784 19 0 ..	18·80

Saving in Retort-House Labour with De Brouwer's Hot-Coke Conveyors.

Inclined retorts at Mariendorf with De Brouwer's hot-coke conveyors over inclined retorts at Gitschinerstrasse	22 ..	£84 16 0 ..	2·03d.

Saving in Retort-House Labour with Horizontals and Machine Stoking.

Horizontals with machine stoking over hand stoking with generator furnaces at Schöneberg	60 ..	£362 18 0 ..	8·70d.
,, ,, hand stoking at Schöneberg over hand stoking at Holzmarktstrasse (generators *v.* fire-bars)	41 ..	222 11 0 ..	5·30

is, after all, the chief thing. Through the adoption of our new "Hayman" stop—having neither rivets, bolts, or screws—the excessive wear and tear with the old riveted model has been very considerably reduced.

From my long experience with the inclined system, both in Vienna and Berlin, extending over fourteen years, I consider that it is undoubtedly superior to any other system at present in the field; and no one should hesitate to recommend its adoption whenever the question of a new plant should arise.

AN EXPERIENCE IN CANVASSING.

By F. W. Cross, Assoc.M.Inst.C.E.
Engineer and Manager of the Lea Bridge District Gas Company.

In response to the suggestion in the leaderette on "Exhibitions and Interviewing," in last week's issue of the "Journal"—that it would be interesting if gas managers who have tried the system of interviewing consumers would communicate their experiences—the writer may say that early last year, at the instance of one of his Directors, he turned his thoughts to the making of a thorough canvass of the Company's district, purely with the object of increasing the use of gas-cookers.

The following working notes were then drawn up for consideration:—

Canvass.—It is proposed to employ two canvassers, supplied by, and at the cost of, the stove manufacturers, under the sole control and direction of the Company's Engineer. To avoid undue influence being exercised simply to obtain orders, the Company's inspector will in all cases call on the intending consumer to take the definite order.

Hire Purchase.—Special inducement of 20 to 25 per cent. off list prices to those taking stoves on the hire-purchase system.

Charges.—The Company now charge for any extra length of service to meter over 30 feet from the main, with a fixed charge for the connections and fixing of meter according to size, and for any extra length of service to cooker over 20 feet from meter. It is now proposed to extend the lengths of the services to 60 and 40 feet respectively, retaining the fixed charges for the meters. This alteration will meet all ordinary cases, and will remove one of the greatest sources of grumbling by intending consumers. The retention of the meter charges will to a very great extent prevent the Company being imposed upon by what may be termed "short-service" customers, and also act as a deterrent to undue influence on the part of the canvassers.

Rental of Stoves.—To remain as at present, ranging from 2s. 6d. to 4s. 6d. per quarter, and giving a return of just over 12 per cent. on the net cost of the stove. One of our conditions is that the consumer agrees to rent the stove for a period of not less than twelve months from the date of fixing. As a fact, we get very few stoves returned except by people changing residences, or leaving the district.

Slot Meters.—Where it is desirable, where requested, or where objection is made to the Company's charges, it is proposed to fix 1s. slot meters; the rental of meter and stove being charged for with the gas. In no case is it proposed to fix fittings.

Show Rooms.—During the period of canvass, it is proposed to rent shops in different parts of the district, in which a show of stoves can be placed. The canvassers would work from these show-rooms, and get intending consumers to call and see the stoves. The Company to bear the expense of the show-room; and the stovemakers to supply a cook and show stoves in operation.

From these notes, the working conditions for a systematic canvas of the Company's district were ultimately developed, and took the form of an agreement between the Company and the stove manufacturers.

The agreement was in the following terms:—

LEA BRIDGE DISTRICT GAS COMPANY.

Proposed Canvassing for Stove Business. Conditions agreed upon between the Company's Engineer and Representatives of Messrs. Fletcher, Russell, and Co., and Messrs. Richmond and Co.

Canvassers.—It is proposed to employ two canvassers, supplied by and at the cost equally of Messrs. Fletcher, Russell and Co., and Messrs. Richmond and Co.; each canvasser to be approved of, and be under the sole control and direction of, the Company's Engineer.

The main object to be observed by each canvasser is to obtain genuine business; and he is therefore to exercise a wise discretion as to where he may call and in all his dealings with intending consumers, looking for guidance in this respect to the Engineer or the Company's officials.

Each canvasser will be provided with a directory of the district, in which the streets he will canvass will be indicated, and in which present consumers, and those already provided with cookers will be indicated.

Each canvasser will advise his calling by post; then call. Try persuasion, and give full advice. Leave circulars and forms, with cards to be sent to the Engineer, requesting Inspector to call.

Numbered application forms to be furnished to canvassers, but not to be used for indiscriminate distribution. A strict return of the distribution of these forms to be made to the Engineer.

No order will be accepted by the Company until the Inspector has called to verify same.

The condition contained in the agreement form, that the consumer "agrees to rent the cooker for a period of 12 months from the date of fixing," must in all cases be clearly pointed out as one of the conditions of supply.

Each canvasser shall daily submit a full written report to the Company's Engineer of the work done, and at least once a week shall discuss these reports with the Engineer.

The canvassers are not authorized to receive any moneys on behalf of the Company.

Pamphlets and Circulars.—The Company will provide advice notes, introduction cards, cooker pamphlets with conditions of supply, and application forms. No other circulars to be used except by consent of the Company's Engineer.

Concessions by Company.—The Company have amended their regulations as to supply, reducing the charge for services to meter and cooker by increasing the length of service laid free of charge from 30 feet to 60 feet, and from 20 feet to 40 feet respectively, but retaining the fixing charges for meter.

They are also prepared to fix shilling slot meters with cookers in special cases; but this business is not to be forced. It is simply to be used as an inducement where it is impossible to obtain an order for supply by ordinary meter.

Penny slot meters will not under any circumstances be supplied, neither will fittings be supplied, except by special arrangement made direct with the Company's Engineer.

Impartiality of Canvass.—It is a condition of this canvass that the canvassers are to work directly on behalf of the Company; and they are therefore to be absolutely and strictly impartial in their recommendations; their objects being to place a cooker independently of which particular make the cooker may be, and no secret arrangement is to be made between either of the firms and the canvasser.

The firms having mutually arranged the terms and commission to be paid to the canvassers, the commission is to be paid by the respective firms upon all orders for stoves of their manufacture independent of through which canvasser the order is obtained.

No order to be considered genuine until certified by the Company's Engineer.

Undue Influence.—Each canvasser is to be cautioned against using any undue influence in recommending a particular maker's cooker; and what is to be considered undue influence is to be left entirely to the discretion of the Company's Engineer.

In the event of any undue influence being exercised: For the first offence, the canvasser will be cautioned; for the second offence, his firm will be notified and cautioned; for the third offence, the canvasser will be removed, and his firm will not be allowed to take any further part in the canvass.

The Engineer's opinion shall in all matters of difference between any of the parties concerned in this work be absolutely final.

Show-Rooms.—If possible, it is proposed to open a show-room, or show-rooms, central to the whole district, or central to the districts to be canvassed from time to time.

The Company will bear the expense of the show-room, and provide an assistant, fittings, and gas.

The firms will mutually provide a show of stoves in equal proportions, and, as may be mutually agreed upon, will provide a cook to show cookers in operation.

It was further arranged that all salary and commission payable to the canvassers should be paid through the Company's Engineer; a weekly statement of the amount being furnished to the stove makers, who refunded the amount to the Company. As a further inducement to the canvassers over and above their salary and commission on the stoves placed out, the Company offered them a commission upon every new ordinary consumer obtained directly through their agency; but, as the Company had no desire to force the use of slot meters, this commission was not to be paid upon new slot consumers.

A difficulty was found in obtaining shops suitable for show-rooms in the various parts of the district, and a central show-room was consequently opened. The writer is now of opinion that this is the better plan to adopt.

In the development of this canvass, it was anticipated that the following advantages could be claimed:—

Reduction of charges would remove a great obstacle to the increase of business.

Canvassing would, without doubt, introduce a very large number of new consumers.

Consumers using cookers would burn more gas than ordinary consumers.

Consumers taking cookers in the first instance would, in many cases, ultimately use gas for lighting.

The greatest obstacle to the electric light is to get gas introduced into houses either for lighting or cooking.

Where electric light is introduced, the Company may retain the use of gas for cooking.

The result of the canvass was an ample justification of the advantages claimed.

The employment of canvassers commenced on April 29, 1900, and ceased at the end of September. The following figures will show the increase in the Company's business during the whole of the year 1900, subdivided into three periods—viz., before, during, and after the canvass.

	Dec. 1900.	Dec. 1901.
Consumers	2623	3223
Cookers	546	1039

1901.	Ordinary Consumers.	Slot Consumers.	Cookers.
Up to April 30	71	2	37
,, Aug. 31.	153	131	315
,, Dec. 31.	140	103	141

In conclusion, and to give credit where credit was due, the

stove makers employed were Messrs. Fletcher, Russell, and Co., and Messrs. Richmond and Co.; and the writer would desire to express his gratitude to both these firms and to their representatives for their co-operation and the strictly honourable manner in which they worked together to make the canvass a success, and to carry out all the terms of the arrangements made between them and the Gas Company. The results were considered so satisfactory that the canvass will be repeated in 1902.

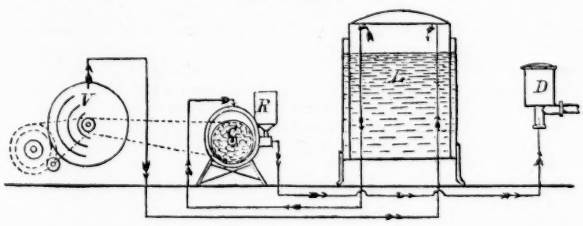
NOTES.

Automatic Discharge of Ash from Boilers.

Some particulars have come to hand from Messrs. Graham, Morton, and Co., Limited, in reference to a system of automatically discharging ash from boilers, which invention fills in a gap that has so far prevented boiler-house operations being continuously automatic. Hitherto the removal of the ash from boilers has been performed by manual labour; but, by means of the new system, the fuel required in the boiler-house need not now be handled in any other way than by machinery from its entrance to its exit in the form of ash. The patent discharger has a door balanced by a weight, and regulated so that it automatically tips or opens upon the accumulation of a settled amount of ash or clinker. At the same time, it rapidly closes on discharging its load, and prevents any inrush of air. If a conveyor is used beneath the dischargers, the ash is taken away without the attendance of a workman. The dischargers have planed doors and faced joints, to prevent as little air as possible entering the furnace. This appears to be a very ingenious contrivance; and its advantages will be manifest to all who are practically acquainted with the work of the boiler-house. Anyone interested in it should obtain from the firm named a little pamphlet, giving an illustration and explanation, and also a description of the completely automatic boiler-house at the Kensington and Notting Hill Electric Light Works.

Lighting by Carburetted Air.

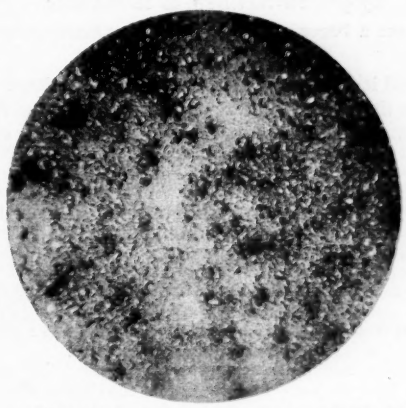
In view of the article on "Air Gas for Isolated Places" which appeared in the "JOURNAL" last week (p. 410), the following description of an apparatus devised by Herr S. Schiff, which appeared a short time ago in the "Chemiker Zeitung," may be of some interest. It is taken from the current number of the "Journal of the Society of Chemical Industry." The small fan V, which is driven by a falling weight, supplies air to the gasholder; the fan being automatically put out of action when the holder is filled. The air from the gasholder passes through the carburettor C, which contains kieselguhr saturated with benzine (petroleum spirit), and thence passes, by way of the pressure-regulator D, to the burners. The device R, for filling the carburettor, is of peculiar construction. It is opened by the



apparatus itself, no benzine can be taken out of it, and the outer air has no access to the liquid. The proportion of benzine taken up by the air in the carburettor is far above the limit of explosiveness; and owing to the great absorptive power of kieselguhr, there is no actual liquid in contact with the air, and thus no drops can be carried over. No combustible gas is stored up, except the small quantity in the carburettor itself. The heating power of the carburetted air produced is about 3000 calories, which may be increased to 4000 calories if a small proportion of benzol is added to the benzine. It is claimed for the apparatus that it can be used economically either with bunsen burners or with mantles for incandescent gas lighting.

Paint Films Containing Air.

Mr. Maximilian Toch has read a paper on "Paints" before the New York Section of the Society of Chemical Industry, which has the distinction of referring to some instructive microscopic examinations of paint films, as indications of the actual condition and behaviour of such films in service. There is more protective paint used in the United States than anywhere else in the world, on account of so much of the building construction being in wood, and also of the prevalence of a fashion for painting even brickwork. Where paint is sold in tins, ready mixed, it often contains about 2 per cent. of added lime water, which Mr. Toch does not regard as an adulterant, because its purpose is to thicken the paint, so that it never settles hard in the tin, and is easily stirred. The presence of water can be tested by putting a slip of gelatine into the paint for twelve hours. Water only is absorbed, and causes the gelatine to swell. Red lead, used on a large scale to protect ironwork before erection is not satisfactory, nor does it bear out the laboratory reputation of the pigment. It is a carrier of oxygen and air bubbles, and does not stop progressive oxidation. It does not form a good protective coating for longer than six months. It is a good first coat, if speedily covered by something more elastic. It is so heavy that it settles down on the top of a beam much more firmly than on the underside. A



"Photomicrograph," × 100, of film of red lead-paint showing grains of various sizes, all more or less encysted with air bubbles.

mixture of red lead, zinc oxide, and artificial barium sulphate is preferable as a paint to any of these pigments used separately. An addition of lamp-black is advised by some, because the defect of red lead is that it is too heavy and takes too little oil, whereas lamp-black alone is too light and takes too much oil. White lead should never be used as a protective paint alone, because it continuously absorbs the oil. Zinc white alone dries too brittle. It will bear the addition of barium sulphate. A paint-film of red lead in linseed oil that looks solid to the eye, is seen under a power of 100 to be transparent in spots, and full of air bubbles. This would appear to indicate that a good deal of protective value of painting depends upon the thorough working out of the entrained air by the painters. It would be interesting to know how the mechanical painters stand affected by this.

We learn that 100 applications have been received for the post of Gas Manager to the Ripon Corporation, lately vacated by Mr. E. E. J. Anderson, who has gone to Middleton. The Gas Committee have reduced the list to six; and the Corporation are expected to make the final selection next Thursday.

The liquidation of the Singapore Gas Company is proceeding satisfactorily. Already three dividends have been paid to the shareholders, amounting together to £2 15s.; and it is hoped to pay the final dividend in the course of a few weeks. We think the shareholders will regard this prompt clearing up of their affairs with some gratification.

A vacancy has occurred in the parliamentary representation of Wakefield, owing to the fact that, by the death of Earl Fitzwilliam, Viscount Milton, M.P., succeeds to the peerage. The Conservative Party have two candidates ready, one of whom is Mr. E. Allen Brotherton, head of the firm of Brotherton and Co., Limited, chemical manufacturers.

Under the style of "Drake's Limited" a Company has been formed, for the purpose of amalgamating the old-established firm of Jonas Drake and Son, of Ovenden, Halifax, and the Gas Engineering Branch of the Leeds Fire-Clay Company, Limited. The share capital is to be £90,000, divided into 40,000 cumulative 6 per cent. preference shares of £1 each and 50,000 ordinary shares of £1 each. The prospectus, in abridged form, is published elsewhere in this issue.

"Patents for Inventions, and How to Procure Them," is the title of a little book by Mr. G. Gatton Melhuish Hardingham, Assoc.M.Inst.C.E., &c., which has just reached a second edition. It consists of notes on the law and practice relating to the grant of letters patent, compiled for the use of inventors, patentees, and others interested in the protection of industrial property. At the end of the notes, a schedule of fees payable at the Patent Office is given; and there is a full table of contents. The author is a Fellow of the Chartered Institute of Patent Agents; and his publishers are Messrs. Crosby Lockwood and Son.

A Special Committee of the Franklin Institute, Philadelphia, has reported in favour of the adoption of the metric system of weights and measures in the United States. The National Government are urged to enact such laws as will ensure the adoption of the system in its various departments, as rapidly as may be consistent with the public service. For convenient small units of every-day measurement, the millimetre is held to be better than either 1-16th inch or 1-32nd inch; the latter being rather a fine subdivision for ordinary rough measurements. If the Government can be induced to sanction the system in all their departments, it is believed that the adoption of metric measures throughout the country would follow within a reasonable time.

TECHNICAL RECORD.

HIGH-PRESSURE GAS LIGHTING.

By Joseph Nasmith, of Manchester.

[Extracts from a Paper read before the Manchester Association of Engineers last Saturday.]

Threatened industries, like threatened men, live long. Twenty years ago or thereabouts, a loud and alarming cry went forth, consequent upon the introduction of electricity, that the era of gas illumination was at an end, and that the future was in the hands of the electricians. As we grow older we grow wiser, and those who threw away their gas shares for nominal considerations have lived to regret it. So far from gas being a defunct lighting medium, the make of it increases year by year, and it is now the very best illuminant, so far as brilliance and economy are concerned. It is becoming a necessity for heating as for lighting, and it is by far the best for both purposes. It is true that there have been many changes in its application; and, impelled by competition, some of these have been radical—the stimulus of rivalry being useful in this as in other industries.

In the main, the path of improvement may be said to be marked by two stages. The first was making practicable the system of incandescent lighting which was the work of Dr. Auer von Welsbach in the early eighties. In principle, it was no new idea; but the merit of Welsbach was that he was able to discover a material which was capable of a high incandescence, while at the same time refractory enough to last under such conditions for a reasonable time. It need hardly be said to those who had experience of the Welsbach mantle in its early days that there is a marked difference in its lasting properties now and then. Nor is it likely that the improvement is at an end; and we shall see beyond doubt, in a few years, better and cheaper mantles placed at the disposal of the public. This would have happened before but for the monopoly obtained by the Welsbach Company.

The second stage in the development is the introduction of high pressure, or, as it is sometimes called, "intensified" gas lighting. It will no doubt be known to most present that the ordinary incandescent burner is of the bunsen type, being fed with gas from a small jet; the velocity of the gas so delivered through a tube inducing a current of air of sufficient volume to ensure the perfect combustion of the gas. The pressure of the latter varies with the locality, being generally not much over one inch of water. It is obvious that at this pressure the velocity of the gas-jet and the consequent induced current of air will be comparatively slow. The new method consists in compressing the gas to a pressure of about 8 inches of water—one-third of a pound—and so increasing its velocity at the jet; thereby inducing a greater volume of air to mix with it in the body of the burner. Of course, this pressure is only high in a comparative sense; but it is the first step on a path which may lead us very far. In considering this last development, no pretence is made of doing more than collating the particulars already well known; and it is only because the new system provides an improved method of lighting which is at once cheap and effective, that the attention of the members is directed towards it. It is already making great headway for internal illumination, and especially for workshops; and on this account it forms a subject of interest to all engaged in industry.

The chemistry of the matter hardly forms a part of this subject which needs dilating on. It is sufficient to state that the gauze forming the cowl or mantle is made of cotton, and is impregnated with solutions containing thoria and ceria in certain quantities. The determining element in the value of the mantle as an illuminating medium appears to be the proportion of cerium present. Many will remember Professor Tyndall's famous experiments at the North Foreland with lighthouse lanterns lit by the electric arc and by oil. The conclusions that were drawn by him remain valid to-day, because they are founded upon a fact which is unchangeable. In considering the question of illumination, it must be remembered that mere brilliance is not the highest property, except it is desired to deliver a flash of light to a specific point, as in the heliograph. Diffusion—or perhaps more correctly suffusion—is more important. The light from an electric arc lamp is brilliant, but it is coldly penetrating, and diffuses itself to a very slight extent. It is this property which causes it to cast so great a shadow. The air is not filled with light as it should be; and outside the direct range of the rays there is no communication of light. How different is the light of the incandescent mantle. Within its range of illumination, it seems to suffuse the air with light, and make luminous all the space within that range. Widen its range, and you increase its usefulness. It produces no violent shadows like the arc light, but distributes the light with remarkable uniformity. It is the object of the system of intensified gas lighting to widen the range of the ordinary incandescent mantle, and thus increase its illuminating value.

It has already been remarked that in accordance with the pressure of the gas it is necessary to regulate the velocity of its inflow so as to cause it to mix with itself a certain volume of air to ensure the most complete combustion. The same remark applies to the composition of the gas, which varies in richness to a considerable extent. In the standard argand gas-burner, the velocity of the effluent gas is 5·25 feet per second—a velocity which is much exceeded by the ordinary low-pressure incandescent burner, and is only about half that of the burner used with gas at a pressure of 10 to 12 inches of water. The effect of this change is remarkable. The ordinary argand burner gives a light of about 5 candles per cubic foot of gas consumed; while a mantle heated by the flame of a burner fed with compressed gas will give from 30 to 32 candle power per cubic foot. It is, of course, necessary that the burner should be properly designed to give the right admixture of air.

The amount of compression at present is from 8 to 12 inches on a water-gauge; but this is not a fixed amount. There are two principal methods of obtaining this pressure. In the first, the gas, after passing the meter, is compressed before entering the service-pipes. In the second, it is compressed in the lantern by means of mechanism on the principle of a hot-air engine, and actuated by the heat evolved by the burner. The latter system is perhaps better adapted for external lighting, on account of the self-contained character of the lantern, and is worth a description on account of its ingenuity. The first-named method may be called a collective, and the second an independent system.

The first method can be easily applied in any workshop. The first thing to do is to determine the unit to be lighted. In most cases, a complete workshop would form a convenient unit—each detached building, if large enough, being treated as a complete shop. In each of these there is usually an internal outfit of pipes, which, if properly fitted so as to be tight, can be used as the inside service for the purpose of distribution. To them the needful lamps can be affixed, and all that is required is to provide the necessary compressor. There are two compressors in use, one of which is much simpler than the other. It is known as the "Keith," being supplied by the James Keith and Blackman Company, Limited. [The author, by the aid of a diagram, described the apparatus and explained its action.]

The Scott-Snell lantern has fitted within it the requisite number of burners and mantles, and has formed at the top an annular space, within which works loosely a piston or displacer. The inlet of the gas is at one side of the annular space, being admitted by a drop-valve, and discharged at the other side by a similar valve. The arrangement resembles a hot-air engine, and in action is the same. The annular receiver is made of metal, and forms the top of the lantern above the burner and mantle. Above the gas-chamber, water is placed to keep the upper part cool; and a tube is carried from the chamber through the water-space, in which an upwardly projecting spindle from the piston or displacer works. The spindle is attached at its upper end to a spring diaphragm weighted by a spring which establishes the necessary pressure. The inlet-pipe conveys the gas from the main to the gas-chamber, and the outlet-pipe from the latter to the former. The action is as follows: When the burner is first lit, the displacer is in its central position, and gas passes freely through the chamber, in which there is an equilibrium. As the gas becomes heated, its expansion begins, and at first the hot gas flows along below the displacer, and mixes with a similar, but cold, current above the latter. As more heat is absorbed by the gas, it is still further expanded, until it closes the inlet-valve and raises the displacer against the resistance of the diaphragm and spring. Gas thus flows out, and the reduction of the pressure causes the displacer to fall, upon which the inlet-valve is opened, cold gas flows in above it, and contraction takes place. Upon this the outlet-valve is closed by the pressure beyond it, and the process then begins *de novo*.

There are two points deserving of notice. When the displacer commences to fall, a flash of the hot gas passes above it and is chilled—thus creating a partial vacuum and accelerating the descent of the piston. The second point is that the diaphragm for a certain portion of its deflection during the ascent of the displacer preserves a spheroidal shape, but at or near the end of the ascent becomes conoidal. The effect is to help the final portion of the ascent, and conversely, in descending, to quicken the speed of the displacer early in its downward stroke.

Having thus described the chief instruments employed, it will now be convenient to give some instances of the use of this new system of lighting. Many members no doubt saw the magnificent specimen of outdoor lighting in the main avenue at the Glasgow Exhibition last year. The lamps there were in two rows, one on either side, each series forming a circuit provided with a separate Keith compressor. The lanterns, burners, and mantles were supplied by the Welsbach Company. In all, 237,000-candle power was provided by this series of lamps. The gas cost 2s. 6d. per 1000 cubic feet, and the expenditure for gas consumed was 17s. per hour or a little less, or about 0·86d. per 1000-candle power. It is safe to say that no system of electric lighting could be devised which would give so great a flood of light at anything like the cost. The pressure in this case was maintained at 8 inches, and as many of the lanterns were designed to give 1000-candle power with a consumption of 3½ cubic feet of gas per hour, they could be compared with the so-called 1000-candle power arc lamps placed near, much to the disadvantage of the latter.

Many of you have no doubt noticed the brilliant display of intensified lighting on Piccadilly, where it is in competition with the electric arc lamp. We owe this to the prescience and vigour of Alderman Gibson. The lamps here are in one circuit, the combination again being that of Welsbach mantles, burners, and lanterns, with a Keith compressor. As this was merely an experimental plant, careful particulars were kept of the cost.

consumption, and maintenance; and the following summarized figures will show the result. They had been furnished by Mr. James G. Newbigging, the Gas Engineer to the Corporation, and relate to 36 days work. The cost of laying the special service-pipes for gas, the necessary water connections, cost of compressor and burners, and all other expenses, was £155 os. 2d. For maintenance, the installation cost, including 10 per cent. interest on capital, £18 9s. 2d., made up as follows: Gas, 83,000 cubic feet, at 2s. 6d. per 1000, £10 7s. 6d.; water, 25,560 gallons, at 4·85d. per 1000, 10s. 4d.; mantles (70) and rods (1), £4 7s. 7d.; extra attendance and glazing £1 17s. 11d.; and interest for one month, at 10 per cent., £1 5s. 10d. The number of hours burning was 347, the number of burners 35, and the consumption of mantles two per burner in the time. This has been considerably improved upon. The relative cost of the various systems of lighting is: For flat-flame gas lighting per 1000 candles per hour, 7·5d.; for the ordinary low-pressure lighting by Welsbach incandescent burners, 1·96d.; and for the Piccadilly installation, 1·77d. Compared, therefore, with the other systems of gas lighting, there is a decided gain, and with the electric light the cost is reduced by at least one-half on the most favourable basis.

It will be noticed that in this cost is included that of a separate service for the series of lamps. The ordinary service-pipes in Manchester are, of course, only carrying the low pressures, which alone can be used with the present fittings. In the case of a workshop, the internal service-pipes are already in position, or, if a new building, they would have to be put in in any case; so that this factor need not be taken into account. Further, several of the most advanced gas companies are beginning to encourage the use of the incandescent fittings by their customers, and are inaugurating a system of regular inspection, under which they superintend the fittings and put them into good condition.

In such a case as this, it would be easy enough to lay the mains so as to carry a pressure of 8 inches; but as for a long time the intensified light will only be wanted for particular districts or areas, the use of special service-mains for out-door lighting will probably be the best plan. These, of course, are not needed if independent lamps of the Scott-Snell type are used. For internal lighting, however, the only addition is the compressor and the lamps; and this system will probably prove to be most adaptable. Mr. A. W. Onslow, of Woolwich, in a paper read on the 16th of November last, advocates much higher pressures than 8 inches, and expresses an opinion that a 2000-candle power burner may yet be obtained.*

The figures just given, which will in a short time be supplemented by many others which cannot now be procured because of the short time during which the system has been in vogue, show that the new method of lighting has favourable points which cannot be overlooked. For outdoor lighting, it is making great strides; but it is probable that the conditions will be more favourable internally, because the non-exposure of the mantles to gusts of wind will lengthen their life. The Tower Bridge, Blackfriars Bridge, and Southwark Bridge have now all been lighted by this system; there being 22,200-candle power on the first, and 11,700-candle power on the second. In the latter case, there is a comparison to be made with the electric arc light, again to its disfavour. There are some special appliances used in connection with the lamps so as to avoid certain pitfalls in outdoor lighting. The superiority of the light over the electric arc light has been demonstrated in the recent fogs in London, as has been testified to by various observers. It is not alone in usefulness and illuminating power that the light excels; it is much more economical, as can now be very easily proved.

One factor of some importance must be touched upon before closing. A great deal has recently been heard of Mond gas, which is a well-known material modified. The use of water gas, enriched or otherwise, is now very prevalent; and with the extension of gas heating and the incandescent mantle, the time has come when a reconsideration of the question of the illuminating power of gas may be made. Mr. George Livesey, one of the most far-seeing gentlemen among those controlling the gas industry, has already pointed the way by inducing Parliament to consent to a reduction of the standard from 16 to 14 candles; and it is not too much to expect that, with the new developments, this standard may be brought down still more. A rich gas is necessarily a dear gas; but if the standard of richness is reduced, the cost will be correspondingly reduced. In other words, the consumer will be able to get his heat and light on lower terms, and in this way save his purse and purify the atmosphere. At present, nobody in the gas industry is standing still. There is a commendable activity in the profession; and seeing that every reduction in the cost of gas strengthens the prospects of the industry in competition with electricity, the gas engineer may well say—

> Sweet are the uses of adversity,
> Which, like the toad, ugly and venomous,
> Wears yet a precious jewel in his head.

Discussion.

The PRESIDENT (Mr. E. G. Constantine) opened the discussion by saying that Alderman Gibson had been invited to attend, but had sent a letter in which he regretted his inability to be present. The Alderman added that, in his opinion, street lighting by means of incandescent burners, and, where practicable, intensified or high-pressure gas lighting, was by far not only the best and most efficient, but the most economical mode of street lighting yet discovered. This was evidenced by what he ventured to call the fine exhibition of street lighting opposite the Manchester Infirmary. This, however, he believed, would be thrown into the shade by the installation they were putting up round the new Technical School in Whitworth Street, which he hoped all interested in street lighting would see when completed in about two months from the present time.

Mr. JOHN WEST observed that he was delighted to hear what Mr. Nasmith had said on the subject. There was a time when gas men were told that they were about to be extinguished; but he had never believed it. Some of them would remember what he had told them about ten years ago. He thought he was one of the first to indicate his belief that electricity had a great future, as a motive power. This had come true. At the same time, he said he felt it impossible it could ever compete economically with gas lighting; and, from experiments worked out, he had given statements and facts which had never been refuted. He was pleased with what Mr. Nasmith had laid before them. There was not much in the paper to discuss. It was merely a statement of facts which the electricians might try to "rub off the slate." They were indebted to the Corporation very much for showing them the advantages of intensified gas. As to the lighting of workshops by incandescent gas, he (Mr. West) read a paper before the Association on this subject some years ago, when he referred to experiments in his firm's works, where he put clusters of six burners, under 31 reflectors, about 6 feet in diameter. They were a great success at the time; and he had had no end of inquiries, which had resulted in many other workshops being lighted on the lines laid down. Now there was the intensified gas; and, of course, they should adopt everything new as it came out, if it was an improvement. As to the figures given for the Piccadilly installation, he thought some of the expenses would be considerably reduced in future. On the question of supplying rich or common gas, he thought he was the first gas engineer to place on record that they could get as much light from an incandescent burner with 14-candle as with 25-candle gas. Then why should they make this rich, expensive gas? He said: "Don't make it;" and if everybody would use incandescent mantles, the Corporation could at once lower the quality of the gas, and reduce the price accordingly, which would be a great boon to the whole of the city. Mr. Nasmith had referred to what Mr. Livesey had done. They had to convert the Legislature from the error of their ways. When a gas company went to Parliament for extended powers, the local authorities had been in the habit of pressing that the illuminating power of the gas should be increased. Now, to bring about the advantages they could derive from incandescent mantles, they wanted to have it reduced; and Mr. Livesey was the means of convincing the House of Commons that it would be an advantage to the public generally to reduce it. He himself had to marshall a Bill through last year. The Local Authorities opposed it; but he succeeded in convincing them that if they did not insist upon increasing the candle power they would be able to keep the price lower. Then the Board of Trade had to be fought; but they were ultimately induced to withdraw their opposition, and in the Act the gas was to be 14-candle power. This was the direction in which they required to proceed. With regard to the electric light, he had not said much against it, except that it was very expensive; and he questioned the wisdom, when they had a splendid business, of going in for a speculative one. This, however, was what the Corporation did. They gave up a beautiful part of the city which was lighted by gas, and was putting a profit into the exchequer to reduce the rates, and handed it over to the electricians. He had no objection to the electricians taking it if they paid for it, and made good the profit formerly derived from the gas. This had not taken place; and gas consumers were being mulcted by those who used the electric light, to make up the deficiency. Mr. West then related an incident in connection with a lecture he had heard on "Municipal Socialism," in which the lecturer, after talking about the "grand electric light," had referred to "its poorer brother, the gas." In the discussion which followed, he (Mr. West) had informed the lecturer that while the Manchester Gas Department had last year handed over £50,000 in reduction of the rates, the Electric Lighting Department had to be subsidized to the extent of £5000. Therefore he did not like to be patted on the back, and called a "poorer brother." As an engineer, no one had a higher respect than he had for his electrical engineering brethren. They had worked up their mechanism to a perfection which was really marvellous; but with gas they could get the result with less expense and trouble. He therefore thought there was a future for the "old fogey." They should get to know what was a good thing, and when they found it, not throw it over because something new and fashionable came in the way, until they had thoroughly proved it.

Mr. ROBSON observed that among sensible men there could be no question about the relative cost of gas and the electric light. Taking street lighting for instance, for the electric light they had to sink a good deal of money in copper mains, which were much more expensive than the ordinary gas-mains. But as regarded the applications of the two lights, there were some places where one and some where the other was most suitable; and they ought therefore to feel grateful for having both at their disposal. The electric light had advantages from the point of view of keeping

* The author gave a long extract from the paper referred to, which appeared in the "JOURNAL" for Nov. 19, 1901 pp. 1314-15).—ED. J. G. L.

the air purer, and of cleanliness; and as regarded its application in works, they would find that where they adopted electricity for motive power, they had to have a certain amount of generating plant, which rendered it much less expensive to adopt electric lighting than if an installation had to be specially put up.

Mr. SAYERS said he noticed the mantles in the new system that were shown were suspended from the outside; whereas the ordinary mantles were suspended on a crutch in the centre. When on the Continent a few months ago, he noticed that in the ordinary mantles suspension from the outside was more common than the method usually adopted here. He would like to know whether any difficulty arose in the new system through the freezing of the water in wintry weather. There was no doubt that incandescent lights required more attention than an ordinary burner. On the visit of the Institution of Gas Engineers to Berlin a few years ago, it was noticed that all the incandescent lamps there were in good condition—no bad mantles, no half-lights. At first, they thought the mantles were put up specially for the visit; but it was not so. They found that the lamps were always kept in good condition. They had not only a lamplighter, but a man to go round and see if the mantles were in order, so that bad ones might be replaced, and the efficiency of the lighting kept up.

Mr. JOHN J. ROYLE thought Mr. Nasmith was not only conferring a benefit upon them as engineers, but a public benefit, in bringing forward the subject he had dealt with. His firm had recently installed a new works in the neighbourhood of Manchester; and the question of lighting was one to which they devoted a good deal of attention. In looking about to find which was the best system, he had, among others, seen the beautiful installation at the Glasgow Exhibition. No one who had done this could go away with two opinions as to the future of intensified gas lighting. Ultimately they decided to put down an intensified gas plant. They had installed at their works at Irlam 19,000-candle power altogether; and the cost price to fit up the system was £231 19s. 3d. The installation was put up by the Keith-Blackman Company; and he was bound to say the work had been well put down, and they had had no trouble in that respect. They had ten lamps of 1000-candle power each in the machine shop, which was 250 feet by 90 feet; six lamps of 1000-candle power in the iron foundry, which was 120 feet by 90 feet; two lamps of 500-candle power each in the brass foundry, which was 90 feet by 90 feet; a 1000-candle power lamp in the stores; and a lamp of the same power for other purposes. On Jan. 21, 22, and 23, they made careful tests. For 10 hrs. 20 min. illumination, burning full power, the gas consumed was 8040 cubic feet, with the light derived from Salford gas at 2s. 9d. per 1000 cubic feet, which worked out at £1 2s. 1d.; and the cost in mantles was 3s. 4d.—making a total of £1 5s. 5d. The cost of the 10 hrs. 20 min. burning for 19,000-candle power worked out at 2s. 2½d. for gas, and 4d. for mantles, or 2s. 6½d. per hour. This was very nearly equal to what Messrs. Keith & Blackman undertook. They estimated about 1s. 10d.; but he might say that he had calculated in his figures interest on capital, maintenance, 10 per cent. depreciation, and also for the time occupied in looking after the plant by a competent man. As to the general lighting result, the shop was well lighted, and the men could work in comfort. On the side of the shop where active tools were running and the brass-finishing side, they had, however, adopted electric incandescent lamps as supplementary lights. He did not think it was possible to light a lot of tools satisfactorily from a group of lights in the centre. A man wanted local light over his work, and for this purpose they adopted the electric light; so that they had a good local light where this was necessary, as well as a satisfactory shop light. On the whole, he was very pleased with the system, and thought it had a distinct future before it for shop-lighting and engineering works. With regard to water loss, he had not taken this into account in the figures, because. though they did lose water, they ought not to do so; and they were making a re-arrangement whereby the water would be conveyed to the boiler-house and used for feed purposes. In most cases, a little scheming would save this loss. As to freezing, the only thing was to put the apparatus where it would not freeze.

Mr. HARPER remarked that, when they had gas-engines of large units, as they would shortly have in the South Staffordshire district, he thought it would be possible to generate electricity at a far cheaper rate than at present, and that it would then be a great competitor with gas lighting. Very common fuel could be used in generating producer gas.

Mr. MELDRUM asked what would be the difference in the price of gas if they reduced the candle power (say) from 16 to 14, and whether 14 was the limit to which they might go, or could they go still lower?

Mr. W. INGHAM asked whether Mr. W. NASMITH had any information about the cost as compared with that of acetylene. Acetylene gas had been adopted in many cases where the users were a long way from a gas-works; and he understood that a number of towns in Ireland had adopted it in preference to the ordinary system. The intensified method appeared to be in its infancy; and he was looking forward to further developments.

Mr. WEST said, with regard to Mr. Harper's remarks, that he had dealt with the question of gas-engines some years ago, and recommended that it would be a cheaper way of producing the electric light to use a gas-engine. He was a great advocate of the gas-engine; and no doubt electricity, with a moderately low-priced gas, would be cheaper if produced in that way. With regard to generator gas, he had made experiments with Dowson gas as against Manchester gas, about 15 years ago, in gas-engines; and he found that, although the cost was much smaller per 1000 cubic feet—namely, 7d.—the larger volume required to produce the same effect, and the expenses in connection with the plant and its working, made the cost more than with Manchester gas at 2s. 6d. per 1000 cubic feet. Mond gas was simply generator gas; and they proposed to sell it at 2d. per 1000 cubic feet. Generator gas could be manufactured *in situ* at 1d. per 1000 cubic feet; and he was making it in large volumes at that figure. As to the reduction in cost attending a lowering of candle power, it depended somewhat upon the first cost of the material and the apparatus employed—whether they used machinery for stoking, &c. If they wanted to increase 1-candle power, they usually put it at from 1¾d. to 2d.; but if they were to reduce it, he thought they would do so at a somewhat different ratio, and as they went down they might get it to 1d. As to the question why they did not go down, he could see no reason. He had made experiments, and so had Dr. Macadam, who went as low as 8 candles, and got the same illuminating power—with incandescent mantles.

Mr. BICKERTON thought there was very little difference in value between Mond and Dowson gas. The latter could easily be produced, including fuel, labour, and interest on cost, with plant of reasonable size, at a little over 2d. per 1000 cubic feet, which meant that it was equal to ordinary gas at 10d., as, owing to the low heat value of the gas, something like four times the quantity was required. With regard to intensified gaslight as compared with electric arc lamps, he would like to point out the advantage of using a gas-engine to develop the electricity for the arc lamp. Keeping on the generous side, it would take (say) 20-horse power to give the same light with arc lamps as with high-pressure lights at Messrs. Royle's works. If this was so, they would not have burnt more than about 350 cubic feet per hour, or about 3500 cubic feet for the period of ten hours, as against 8040 cubic feet with the incandescent lamps. One great objection to the incandescent light for workshops was the character of the mantles, which, with cranes working and heavy machinery going, soon began to deteriorate. They always wanted, for many jobs, a handy light which they could put anywhere; and this was not possible with the incandescent gas-lamp. A comparison of incandescent gas with electric incandescent lighting, would not be the same as with arc lighting, as they could not get similar illuminating value from a horse power with the incandescent electric light as with the arc, and consequently would have to burn more gas. But he thought they would get about the same light from the incandescent electric lamp for no more consumption of gas in the engine than they would use at the burner with the incandescent gaslight.

The PRESIDENT thought they had to consider which was the best light for a workshop, consistent with all the other conditions which had to be observed; and whether such conditions rendered electricity, gas, or oil necessary was a matter which they had to decide for themselves. Such a paper as the one they had just heard would help them in forming a judgment on the matter.

Mr. NASMITH, in briefly replying upon the discussion, said he would ask Mr. Bickerton if he considered the light from the arc lamp as illuminating as that produced with high-pressure gas. The electric light was penetrating rather than illuminating. He could not give figures at the moment, though he had them somewhere; but there was not the slightest doubt the light he had described, from coal gas, was very much cheaper than acetylene. With regard to mantles, he might say they were far behind the state of perfection obtained in other countries. The reason for this was very obvious. The Welsbach people had got, by means of the patent laws of this country, a gigantic monopoly; but there was a very good prospect of their being, within the next week or so, forced into a fight which would settle once for all whether they were entitled to exercise this monopoly or not. If the Welsbach people happened to be beaten, they would see pouring into this country mantles of a very superior quality—of which there were plenty on the Continent—and the stress of competition would force the Welsbach Company themselves to greater developments. They would thus see a very great improvement in the quality of the mantles used. In conclusion, he might add that high-pressure gas lighting was a subject which had seemed to him ripe for description. It was not in a position in which they could absolutely prove the case up to the hilt, but it was rapidly getting into that condition; and he ventured to say that, within the next twelve months, figures would be available with regard to it, which would show that, with an average quality gas, the cost, including maintenance and interest, would be brought down to as near as possible, 1½d. per 1000-candle power.

A pleasing incident of the dinner recently given by the Chairman of the Gas and Water Committee (Mr. J. Cawthorn) to the employees of the Gas and Water Departments of the Goole Urban District Council, was a presentation made by the officials to Mr. G. England, who has retired from the clerkship of the Council after 26 years' service. It consisted of a smoker's cabinet, suitably inscribed; and Mr. Matt. Dunn, the Gas and Water Engineer, asked Mr. England to accept it as evidence of the esteem in which he was held by the donors, and of the fatherly kindness and courtesy he had at all times shown towards them. In acknowledging the gift, Mr. England said he should prize it as a memento of the services he had rendered, not only to his fellow-workmen connected with the Gas and Water Department, and the officials, but to the town in which he lived.

THE USE OF PRODUCER GAS IN ENGINEERING.

At the Meeting of the Institution of Engineers in Scotland, of which Mr. W. Foulis, of Glasgow, is the President, last Tuesday, Mr. F. J. Rowan read a long paper on the above subject, from which we make the following extracts.

Producer gas is the generic name for the product of what may be called the comparatively slow resolution of solid fuel by means of heat, in apparatus of a variety of designs. As distinguished from the ordinary system of gas making practised in gas-works, where the heat, applied to the exterior of the retorts for the distillation of the coal contained in them, is obtained from coke or other fuel distinct from the charge of coal which is being distilled (although the coke may be the product of coal previously distilled), in the producer system the heat is obtained in the interior of the producer, by the combustion there of the solid portion of the charge of fuel which is being gasified. It has become so much the fashion to affix the name of the inventor or designer of the form of producer used to the product of that apparatus, and thus to speak of "Siemens gas," "Dowson gas," "Mond gas," and so on, that ordinary people may be excused for not recognizing the fact that the "gas" is virtually the same in all these instances, as the process employed is, to all intents, identical in all kinds of apparatus using internal combustion for the production of combustible gas.

In considering the use of producer gas, it is sometimes urged against it that some of the heat of the fuel must be lost in the process of gasification, and that there will therefore be no economy in employing it. This objection is founded upon an incomplete view of the facts of combustion, as is also the practice of estimating the heat value of a solid fuel by assuming all its carbon to be capable of yielding the full theoretic thermal value of pure carbon burned to carbon dioxide. That is a false assumption, because, in burning solid fuel, part of the heat of combustion is absorbed in transforming the solid into gaseous matter, part in evaporating the moisture originally held in the fuel, and part in dilating and heating the waste gases, so that the theoretical heat of combustion is not the available heat. In burning producer gas, we are wholly freed from two of these sources of loss, and have a much less amount of the third.

Taking a fair specimen of Lanarkshire splint coal, if burned in an open grate its theoretical heat yield would be—

		Calories.
Carbon (fixed)	53·41 × 8000 =	427,280
Hydrocarbons (C volatile, 12·59; H available, 2·96)	15·55 × 12,000 =	186,600
Total		613,880

To arrive at the available heat, however, we must deduct the heat required for—

		Calories.
Evaporation of the water in the coal	11·62 × 622 =	7,227
Expelling gaseous matters in the coal . . .	=	57,920
Total		65,147

Then 613,880 − 65,147 = 548,733 calories. (1)

If this coal were turned into producer gas, with only air blast, and the gas were burned cold, then the heat value would be—

		Calories.
Carbon	53·41 = CO 124·62 × 2400 =	299,088
Hydrocarbons (same as above) .	15·55 × 12,000 =	186,600
Hydrogen derived from moisture in blast	0·288 × 28,600 =	8,236
Total heating value		493,924 (2)

The difference between these two numbers—viz., 548,733 and 493,924 = 54,809—represents only 9·98 per cent. of the heating value of the coal. Most of this difference would, however, disappear if a steam-jet blast were used and the sensible heat of the producer gas were taken into account. It is to be remarked, too, that the figure given above for the volatilization of the solid matter of the coal is probably too low, as it does not allow for the gasification of the fixed carbon, but only for the hydrocarbons existing in the coal. The heat lost in waste gases is excluded in both cases.

Turning now to gas-producers, since their introduction by Bischof in 1839 and Ebelmen in 1840, they have been used in a variety of forms. One form was described by me to this Institution in 1881, and papers dealing with other producers are scattered far and wide. Great advance has been made since the date of the paper referred to, so that what was then considered a good producer is perfectly impossible now. A good producer now-a-days must be capable of being cleaned without in any way interfering with the continuous production of gas, and without permitting the refuse to carry any heat or combustible matter to waste outside the producer. Hence the days of the open-grate producer, like that of Siemens, and of the closed hearth, like that of Wilson, are numbered, as such types are obsolete, and are rapidly being, or have been, abandoned for producers with water bottoms. These I purpose dividing into two classes, the distinguishing feature being a most important one, and even vital to efficient and economical working. These classes are: (1) Those producers which send the blast among the fuel in a lateral or radial direction; and (2) those which do so vertically. Of course, the air, or air and steam, must ultimately, in all producers, ascend, in order to reach the gas-outlet; but the primary direction given to it on entering the producer is the important point to which I desire to direct attention.

1.—When the blast enters the producer, either at the centre or the sides, and is distributed laterally before it can ascend, the centre of the mass of the fuel is not in the direct path of the air, and the most vigorous combustion does not take place there, but is carried towards the walls. The effect of this is to make the walls too hot, favouring loss of heat by radiation, overheating and softening the brick lining, with consequent formation of refractory clinkers, and often (more especially where the blast enters the producer by tuyeres or passages in the side walls) allowing uncombined air to escape upwards along the walls, and ignite the combustible gases in the upper portion of the producer. This latter effect may be detected by the percentage of carbon dioxide in the producer gases. The percentage of unburnt cinder, coke, or coal in the refuse is another proof of imperfect combustion in such producers. For examples of this class of apparatus, I refer to the producers of Wilson with water bottom, Dowson, Mond, and others. Of these, in the first-named the blast is blown horizontally towards two opposite sides from the central tuyere or channel placed nearly across the centre of the bottom; in the second, the blast is distributed radially from a circular pipe or tuyere standing vertically at the centre of the bottom, and having a cowl or cone-shaped cover over its end; and in the third, the blast is admitted at the sides from the outside casing or belt. These illustrate varieties in the methods of constructing and working such producers; but there are many modifications.

2.—Of the second class referred to above, the only example with which I am acquainted is that of the Duff producer. No other has been as yet introduced which combines with a water bottom the means of delivering the air vertically in the very centre of the mass of the fuel, and yet of distributing it evenly throughout the whole mass. This power it owes to its ingenious "grate" or sloping grid, which is placed right across the centre of the producer at the bottom, presenting no obstruction to the passage of the air directly upwards through the centre of the fuel, and, on account of the angle of the grate, distributing the air over the main surface of the section of the producer. As showing the wide difference between the proportions of the different producers, Mr. Duff stated, in the discussion of a paper by Mr. Wilson at the West of Scotland Iron and Steel Institute, that the blowing area in the Duff producer grate was 1720 square inches, as against 160 square inches in the tuyere of the Wilson producer of a similar capacity. Such proportions could not fail to exert a marked influence on the completeness of the combustion of the fuel, especially when combined with the excellence of the Duff system of air distribution; and it may be confidently asserted that no one has seen the perfectly burned ash, with a minimum of hard clinker, which issues from the Duff producer, equalled in the working of any other. The quality of the refuse is an unfailing test of efficient working, and one to which attention cannot be too strongly directed.

As to what is the proper basis for the estimation of the efficiency of gas-producers, opinions differ. Mr. C. F. Jenkin defined the efficiency as the ratio of the heat contained in the gas as it leaves the producer to that contained in the coal from which the gas was made. But, in order to obtain this ratio, continuous analysis of the gas and observations of its temperature are required; and these are seldom available. Moreover, "the heat contained in the coal" seems to be not so fair a basis of comparison as "the available heat" obtained from the coal. Mr. H. A. Humphrey, in replying to the discussion of his paper on "Power Gas and Large Gas-Engines for Central Stations,"* pointed out that the term "efficiency" might be used to express a variety of different ratios, or that the ratio between the original fuel and the producer gas might be estimated in either of several different ways. None of these seems any clearer than the one proposed by Mr. Dugald Clerk in the course of the discussion on a paper on "Gas-Producers" read by the writer at the Institution of Civil Engineers in 1886,† which has the convenience of giving a standard with which analyses of producer gases may be readily compared. Dealing with the table of about fifty analyses of the gases yielded by different producers which was added to the paper, Mr. Clerk stated that none of them showed an efficiency of 80 per cent. on his basis, although some closely approached this figure, but that 80 per cent. was a high efficiency. Now, taking the following analysis of gas from Duff producers, we see that, on Mr. Clerk's basis, it shows an efficiency of almost 81 per cent.: CO, 26·8; H, 13·4; CH_4, &c., 4·4; CO_2, 4; N, 51·4. This is not a picked analysis, but is stated to be the average of daily analyses ranging over a period of several weeks. The quality of coal used in the producers is, however, not stated.

In presence of an abundance of cheap coal, people seldom stop to consider how wasteful a machine a coal-fired furnace is. They argue that it has a comparatively low first cost, and is of simple construction; and if penalties for smoke nuisance can be avoided, it will do very well. It is the fact, however, that about 19-20ths of the theoretical heating power of the coal are wasted in such furnaces when applied to welding, re-heating, or forging, and about three times this proportion, or about 60-70ths, where higher heats, such as for melting steel, are required. Besides going far

* See "Journal," Vol. LXXVI., p. 1509; and Vol. LXXVII., pp. 206, 398.

† *Ibid.*, Vol. XLVII., p. 118.

to prevent this great loss of heat, gas-fired furnaces present another element of saving to the user of them, and that is found in the fact that a much cheaper grade or quality of coal may be used in a gas-producer for fixing-furnaces than could possibly be used in direct coal-firing.

In considering the furnaces which are specially useful to engineering and shipbuilding, we find there are six kinds: (1) Furnaces for steel and iron making; (2) furnaces for metal heating; (3) furnaces for subsidiary heating operations; (4) furnaces for steam raising and evaporating; (5) brick-kilns; and (6) furnaces for heating retorts in gas-works and the like.

1.—This section comprises open-hearth and crucible steel-melting furnaces, furnaces for puddling iron, and those used for welding iron, such as for making rolled bars and plates, forgings, and tubes. It is in connection with the high temperatures that are required in these operations that producer gas has won its greatest triumphs; the reversing regenerative furnaces, without which they could not be economically obtained, being almost impracticable with solid fuel.

2.—Re-heating furnaces for steel and iron, plate and angle bar furnaces, furnaces for rivet and bolt making, and for weldless chain making, do not require so high a temperature, and consequently may have either modified reversing regenerators or continuous regeneration of the air, or both air and gas. In this connection, the "Weardale" form of furnace, with continuous regeneration of air, is doing excellent work.

3.—Foundry stoves and annealing and case-hardening furnaces fall under this head; and in these cases also, and though the margin of possible saving in fuel is not great, gas firing has advantages of speed, steadiness of heating, cleanliness, &c., which are a recommendation in themselves.

4.—Gas has been applied to firing steam-boilers of various designs, more, however, with a view to economizing labour and wear of boilers, to smokelessness and cleanliness, which the system ensures, than to effecting a saving of fuel. An increased evaporative duty (amounting to from 18 to 25 per cent. in some cases) from the heating surface in a given time has been found to result from gas firing, due to the uninterrupted application of the flame. This also preserves the boiler from alternating strains due to expansion and contraction from the heating and cooling actions of coal firing, which are ruinous to the structure of the boiler. The gas for boiler firing is usually taken from the main flue supplying other furnaces, so that it is rarely possible to obtain accurate figures of coal consumption for steam raising; but separate tests have shown an evaporation of 9 lbs. and 10·59 lbs. of water from and at 212° Fahr. per pound of coal in the producer, cold air being used for combustion. I find that the average of Fichet's results is 9·04 lbs. of water evaporated per pound of coal; that of Haupt's results is 9·88 lbs. of water evaporated; and that of Mr. D. Kinnear Clark's results is 8·96 lbs. of water evaporated—giving a mean of 9·29 lbs. of water evaporated per pound of coal. It is strange that while firms rarely grudge the expense of adding mechanical stokers to boilers, the cost of fitting gas firing, which is no greater in many cases, should be considered an obstacle to its adoption.

5.—This district has the honour of having produced the first, and so far the only, successful gas regenerative kiln for burning bricks, and also a successful gas pottery-kiln. The Dunnachie kiln, which is still in use at Glenboig, and is an element of consequence in the production of the excellent quality of the fire-brick goods of that brand, was described to this Institution in two communications by Mr. John Mayer. Constructive details have been slightly improved since that date, but the principle remains the same; and the low temperature of the escaping gases noted by Mr. Mayer—viz., 150° to 300° Fahr. with one "green" chamber in circuit, and 90° to 180° Fahr. with two "green" chambers—shows how thoroughly the heat is utilized in the kiln chambers.

6.—The only other application of producer gas to furnaces which may be considered as directly connected with engineering and shipbuilding is that of the heating of retorts in gas-works. Various arrangements have been in use for several years, for utilizing the coke in producers which either formed part of the retort-setting or were erected just outside in front of the retort-bench and below the floor-level of the charging-stage. Under such circumstances, the producers were necessarily small; but our President has introduced with success the novel plan of having large producers erected outside the retort-house, the coke being charged into them while still red hot. The four producers erected at Dawsholm heat 192 retorts, with a saving of 10 per cent. of the fuel required in the case of the producers placed in front of the retorts. This arrangement of producers is combined with an ingenious blast governor controlled automatically by the pressure of gas in the main leading from the producers, which causes it to operate upon a valve in the steam-pipe leading to the steam-jet blowers. The force of the blast entering the producers is thus proportional to the pressure or quantity of gas in the mains, so that the demand regulates the supply. There is also a dust collector in the main circuit near the producers which acts very efficiently.*

No paper on producer gas would have any claim to completeness in its view of the subject if it did not in these days refer to the direct use of producer gas in gas-engines. We are here, of course, on somewhat different ground from that on which the value of producer gas in furnace work has to be considered. It is not the direct production of flame that is in question, but the transformation of the potential energy of the fuel into the actual power of the engine. As compared with the steam-engine, the gas-engine saves several steps in the transformation of energy, and this gives to it and the gas-producer a decided advantage. Some producers, such as those of Dowson in this country, and Lencauchez and Fichet in France, have been worked for some years with anthracite or coke as fuel, when the object was the production of gas for use in small engines. But since large-power gas-engines have been successfully made, the field has become vastly wider, and the employment of producers using bituminous coal slack, combined with appliances for the removal of tar and dust from the gases, and in some cases with plant for the recovery of the ammonia as sulphate from the nitrogen of the coal, has become an accomplished fact.

According to Mr. Bryan Donkin, we may take the heat value of illuminating gas roughly at 584 B.T.U. per cubic foot. That of producer gas made from coal varies, according to one authority, from 144 to 165 B.T.U.; but, according to another, it is 190 B.T.U. The gas from Mond and Dowson producers is given as equal to 150 B.T.U. That is a favourable estimate of the gas made from Mond producers using slack coal, the ammonia being recovered from the gas (125 B.T.U. being about the usual figure); but it is about the normal value of producer gas from coke or anthracite. The gas from blast-furnaces using coal is equal to about 137 B.T.U.; and from coke-furnaces it averages about 100 to 110 B.T.U.

In comparison with average steam-engines, where producer gas is used under the boilers to generate steam, 100 cubic feet of power gas burned directly in a gas-engine cylinder will yield as much power as 400 cubic feet burned under the boilers. The consumption of fuel in larger gas-engines using power gas has now been brought under 1 lb. per indicated horse power per hour. The comprehensive remarks on this part of the subject in the Presidential Address at the opening of this session,* and the recent paper by Mr. Dugald Clerk (*ante*, p. 205) sufficiently indicate the great importance which it has assumed.

Combined with it there arises the question of the distribution and cost of power gas. Schemes are put forward for monopolizing large tracts of country in the interests of one form of gas-producer, as far as the right to distribute the gas to consumers is concerned. But that need not deter individual consumers within such districts from supplying themselves with producers for their own requirements, especially as by so doing they will obtain much cheaper gas. Our President can tell us the proportion which the cost of distribution bears to that of production in the case of illuminating gas. For producer gas, that proportion must be very much greater, on account of the immensely larger mains required.

The cost of production is barely above 1d. per 1000 cubic feet with expensive coal. Thus, if we take coal at 10s. per ton in a producer gasifying 10 cwt. per hour, and working 60 hours per week, the quantity of gas yielded per ton being taken at 150,000 cubic feet, the labour cost as equal to 1s. per ton, and the charges for interest and depreciation at one-fourth the cost of the coal, we have, per 1000 cubic feet: Coal, 0·80d.; labour, 0·08d.; interest and depreciation, 0·20d.—total, 1·08d. Of course, with the cheaper dross which would most commonly be used, the cost of the gas is less; and as the labour cost has been arrived at by taking 30s. per week as the wages of one man for one 10-cwt. producer, in the usual case, in which several producers are at work together, the labour charge will be less proportionately. The cost for "labour, interest and depreciation, and sundries" at steel-works in Moravia for converting coke into water gas and producer gas with the Essen apparatus, has been stated by Sir I. Lowthian Bell to have been 2s. 8·18d. per ton of coke; and these charges were, he considered, very high. So that it is probable that, in taking one-fourth of the cost per ton of coal for interest and depreciation alone, I have considerably over-estimated the cost there also. In fact, the ordinary cost of producer gas with good producers, using coal slack, amounts to about ½d. per 1000 cubic feet. The practical advantage, therefore, of giving away to distributing companies from 1d. to 3d. per 1000 cubic feet of gas used does not readily appear.

* The author showed illustrations of this and other producers in the several classes into which he had grouped them.—Ed. J.G.L.

Gas Lighting on the Midland Railway.—It may not be generally known that the Midland Railway Company possess no less than sixteen coal and oil gas-works. The quantity of coal gas made by the Company last year amounted to 294,985,500 cubic feet; and of oil gas, to 41,101,800 cubic feet. The incandescent gas-lights in use at the end of the year numbered 19,648, which was an increase of 6621 in the twelve months. The railway carriages lighted by gas numbered 4580.

Southern District Association.—The next meeting of the Association will be held at the Cannon Street Hotel on March 6, when Mr. W. E. Price, of Hampton Wick, the President, will deliver his Inaugural Address, and a discussion will take place on the paper prepared by Mr. C. Carpenter, on "Further Experience with Reversible Condensers," read at the meeting in November. The Annual Dinner will be held at the conclusion of the business. It will be noticed that the Association have moved their place of meeting further eastward.

* See "Journal," Vol. LXXVIII., p. 1163.

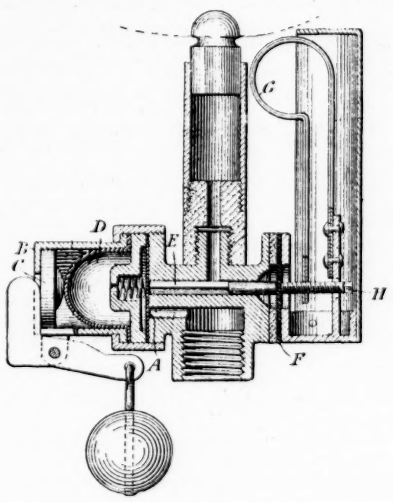
REGISTER OF PATENTS.

Gas-Engines.—Clayden, A. W., of Exeter. No. 18,295; Oct. 15, 1900.

The claims for this invention—relating to gas, gasoline, and inflammable vapour engines—embrace (1) The method of introducing the explosive charge into the combustion chamber, by the employment of intermediate chambers moveable in relation to the main combustion-chamber or cylinder. (2) The combination with the combustion-chamber of a charging-valve of sufficient capacity to take a full explosive charge, and arranged to slide or rotate in a casing provided with inlet and exhaust ports with which the interior of the valve can be brought successively into communication. (3) A charging-valve comprising a casing having inlet and exhaust ports and a port in communication with the combustion-chamber of the engine, and a valve adapted to slide or rotate in the casing, and having a port which can be brought into communication with the ports of the casing in the proper sequence.

Gas-Burner.—Hinckley, H., of West Washington, U.S.A. No. 2250; Feb. 1, 1901.

This invention relates to a burner for automatically shutting off the flow of gas by a combination of a normally closed valve with means for opening and automatically closing the valve gradually when the flame is not burning, and mechanism actuated by the heat of the flame for holding the valve open when the burner is in use.



As shown, the flow of gas to the burner is controlled by means of a valve A—a thin disc of rubber, leather, or other flexible material. This is held tightly against the square end of the outlet gas-passage by a hollow metallic cup having its flanged edge clamped against the disc by means of a cap or union screwed into the end of the casting. The interior of the cup constitutes a valve-chamber; and it has a coil spring bearing against the centre of the valve, in order to hold it normally tight against the gas-passages.

A metallic cap B is clamped against the burner-casting by the same union which clamps the cup in place; and between the flanged end of this cap and the edges of the cup are secured the edges of a rubber cup forming a vacuum chamber. The interior of this cup is in communication with the valve-chamber already described, through an opening in the centre of the disc; and the walls of the cup are provided with minute orifices or pin-holes for a purpose to be described.

Fitting in the bore of the cap is a wooden disc C, and a bell-crank lever projects downward from the cup; its opposite end being provided with a link or chain having at its lower end a ball. The spring holds the valve A closely against the end of the gas-passage, and keeps the flow of gas shut off. But, in order to light the burner, this valve must first be opened, which can only be done by exhausting the air from the vacuum chamber D. This is accomplished by pressing the disc C against the end of the rubber cup, and causing the air to be expelled through the pin-holes. The expulsion of the air causes a vacuum in the chamber D, which overcomes the tension of the spring and pulls the valve away from the gas-passage, thereby permitting the flow of gas into the passage and to the burner-tip, where it may be ignited.

It is characteristic of the present construction (says the patentee) that no valves are employed other than that which controls the flow of gas through the burner; and in order to regulate the return of air into the vacuum chamber D after it has been expelled as described, the pin-holes are provided. When the disc C is pressed inward, the air is forced out of the chamber D through the holes, with the result of opening the valve as described; but immediately on releasing the disc, the resilience of the rubber cup—out of which the vacuum chamber is formed—causes it to begin to resume its normal distended shape (as shown), and the openings of the pin-holes permit the external air to leak through into the chamber and destroy the vacuum.

After the valve has been opened, it must remain open until the vacuum in the chamber D has been destroyed by leakage of air through the pin-holes. Should the flame not therefore be lighted, or should it be immediately extinguished after lighting, the leakage of gas through the burner can only continue while a vacuum exists in the chamber; and this period is determinable in advance by regulating the number and size of the orinces.

In order to hold the valve open while the flame is burning, there is a rod E in a passage in the burner-casting; and at the opposite end of the casting is a small depression or chamber, which is closed by a flexible insulated diaphragm F of leather or other suitable material. The rod is of a length just equal to the distance between the diaphragm F and the valve A; so that any pressure upon the outer side of the diaphragm will cause the opposite end of the rod to press against the inner side of the valve and hold it open. The burner-casting has also a supplemental casting at the side to protect a post, to the top of which is secured one end of a thermostatic strip G, composed of an inner layer of brass, and an outer layer of steel or iron. This strip is bent over inwardly toward the burner-tip, whence it is continued downwardly again to a point opposite the exposed part of the diaphragm F. Into this end of the strip is secured a screw H, adjusted so as normally to bear lightly against the diaphragm F in line with the rod E. When the valve A is open and the flame alight, the thermostatic strip is immediately heated and expands, so as to cause the screw H to press against the diaphragm F and cause the latter to push the rod E through the opening in the burner-casting. The formation of a vacuum in the chamber D having caused the valve to open, a projection on the rod through the burner in this way forms an abutment, and prevents the valve A from returning and closing the passage as long as the flame is lighted. When the flame is extinguished by accident or otherwise, the thermostatic strip cools off and contracts; thus releasing the pressure on the diaphragm F and permitting the spring to reclose the valve and shut off the gas.

Gasholder Tanks.—Cripps, F. S., of King William Street, E.C. No. 5931; March 21, 1901.

This invention relates to the construction of flat-bottom metal gasholder tanks, having the plates forming the circumference of the tank in a series of loops or arcs, of less radius than the radius of the tank itself, when viewed in plan.

Hitherto the practice has been (says the patentee) to curve the plates forming the sides or circumference of tanks to a radius equal to that of the tank; but it has been found impracticable to make metal tanks in this way beyond a certain diameter and depth, owing to the enormous bursting strain from the water pressure within demanding an inordinate thickness of plates in the sides of the tank to resist it. His proposals on the subject are indicated by the accompanying diagrams, in which fig. 1 is a plan of the tank (one-half in section to show the looping of the side plates); fig. 2 is a sectional elevation of the side showing one of the vertical girders hereafter referred to; and fig. 3 is an elevation of one bay showing a pair of vertical girders and the ties and plates uniting them.

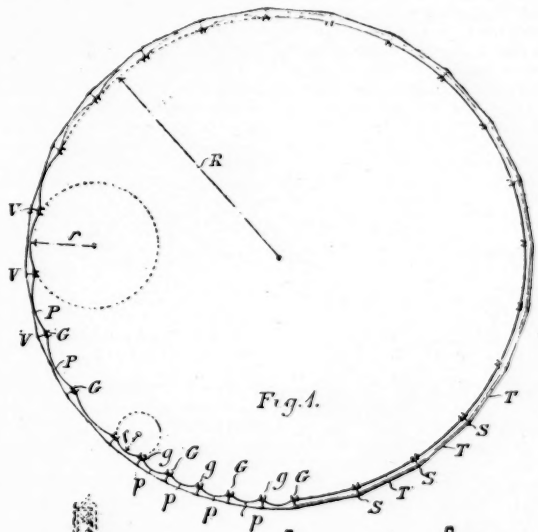


Fig. 1.

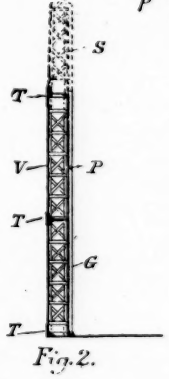


Fig. 2.

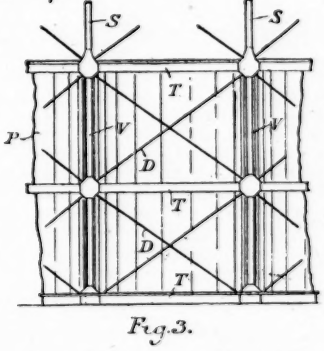


Fig. 3.

The invention consists in reducing the radius of the plates forming the sides of an ordinary flat-bottom gasholder tank by placing a number of upright girders or posts V equidistantly around the circumference of the tank, and uniting them by a series of plates or sheets P, curved to a smaller radius, *r*, than that of the tank itself, R. These upright girders being placed at the intersection of the arcs formed by the curved plates, resist the outward pull. They are preferably fixed in positions corresponding with the standards S and vertical guides G, of the ordinary guide-framing of the gasholder, in which case the standards are supported by the vertical girders. In cases, however, where there are intermediate tank-guides *g*, the upright posts V may also be put at points midway between the standards—that is to say, behind the

intermediate tank-guides—and the side plates *p*, looped between as shown at *g* and *p* in fig. 1. All these vertical girders V are united at the top (and at other levels if required) by strong horizontal girderties T running round the entire circle. The outward pull at the foot is resisted mainly by the plates forming the flat bottom of the tank by the ties T; and in cases where the tank is partly below ground, by the external pressure of the solid ground. The structure may be stiffened by diagonal ties D arranged as convenient.

Manufacture of Gas.—Schniewind, F. W. C., of New York. No. 17,510 Aug. 31, 1901.

This invention relates to apparatus for manufacturing gas, and is especially intended for use in applying "a certain new method of manufacturing gas" described in Patent No. 17,494 of 1901.*

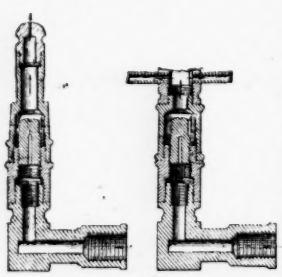
In patent No. 10,588 of 1900,† the patentee described a method of manufacturing gas in which gas produced in (preferably) a multiple series of closed externally-heated retorts, such as coke-ovens, is divided into two portions—one portion richer in illuminants than the other. The portion poor in illuminants is then subjected to treatment, to extract from it such illuminants as it contains; the illuminants being then mixed with the richer portion of the gas in order to increase its illuminating power, and the portion of gas robbed of its illuminants being preferably used to heat the ovens or retorts. This process, while affording a large amount of high-grade and cheap illuminating gas, is subjected to certain limitations, as applied in practice: First, because a certain amount of gas being required to heat the ovens or retorts only, the residual gas of that produced is available for use as illuminating gas; and this, under certain conditions, is considerably less than the amount of gas which the available illuminants would enrich to a standard degree. Secondly, the illuminating gas thus produced, being that derived from the earlier distillation of the coal, is frequently largely contaminated with sulphurous impurities which are driven off in the earlier stages of the distillation, and therefore involves considerable expense in its purification.

The object of the present invention is to provide suitable apparatus by which an increased amount of illuminating gas may be produced, and by which this increased volume of gas contains a smaller percentage of sulphurous impurities, by providing a water-gas generator and connecting it so that it will deliver its produced water gas into the receiver for the enriched gas produced in the ovens; also preferably connecting the generator so that the producer gas resulting from the blowing-up operation will be delivered into the receiver for the poor gas, and delivered in admixture with this gas to the gas-furnaces heating the ovens. In this way, there is provided at the same time an increased volume of rich gas; the actual volume being regulatable, so that any desired standard of illumination can be secured. The increased volume available is not only because of the admixture of the water gas with the enriched portion of the gas, but also because a larger amount of surplus production of retort gas is available for illuminating purposes, owing to the fact that the producer gas takes the place of a certain percentage of retort gas which would otherwise be necessary for heating the ovens.

The method indicated forms the subject-matter of the earlier patent of 1901; the present invention being strictly limited to what is new in the apparatus especially devised for carrying the method into effect.

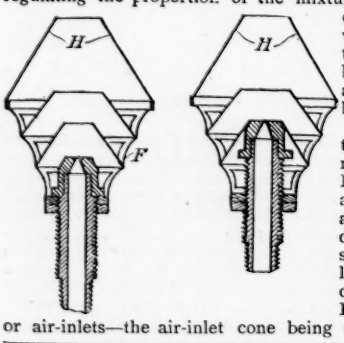
Gas-Burners.—Cayrol, J., of Lacapelle-Marival, France. No. 21,757; Oct. 29, 1901.

This invention (as shown) relates to a device for regulating the gas supply to gas-burners and the like, consisting of a nut with an internal thread, and screwed on the gas-supply pipe, and having at its upper end two threads, one of which is external—allowing the nut to be fitted as required to a pipe carrying the burner—and the other an internal thread of a diameter corresponding to that of the gas-passage, which internal thread receives a regulating stop provided with slots for the passage of the gas. The gas at the summit of these slots encounters a solid part of the slot, and is thus caused to pass out "completely and regularly" with a more or less rapid and abundant flow, according to the depth to which the stop is engaged in the nut, which reduces or increases the annular space in which the gas can expand.



Bunsen Burners.—Schaefer, W., of Hamburg. No. 26,599; Dec. 30, 1901.

This invention relates to gas-burners in which (for the purpose of regulating the proportion of the mixture of air and gas) the mixing chamber can be so reduced in volume capacity as to reduce the air-inlet. The left-hand burner shows a fully-opened air-inlet, and the right-hand burner a reduced air-inlet.



The burner-nozzle is secured to a tubular nipple in connection with the gas-conduit. It is screw-threaded externally, and provided with a ring adapted to be screwed up and down, but secured in any desired position by a screwed lock-ring or nut. The ring carries an inverted step-cone F, with peripheral orifices or air-inlets—the air-inlet cone being constructed so as to narrow downward after each row of air-inlet holes. The top of the inverted step-cone is fitted with a funnel-shaped extension or hood H, joining at its upper end the mixing-tube for the burner. Upon the steps of the air-inlet cone are two hoods, of which the upper one has the largest air-passage at the top. The gas delivered by the nozzle draws in air, which mixes with the gas in the mixing-tube; and the mixture issues from it and burns "with a dark non-light-giving flame." If it is found that too much air is supplied (the inverse not being possible with the proportions adopted) the entire burner is screwed down upon the nipple until the space between the nozzle and the first hood has been sufficiently reduced to produce a better radiated light from the incandescent body heated by the flame. The right-hand burner has been so far screwed down as to close the lower air-passage. The burner may, however, be screwed down still further if required, so as to reduce also the upper air-passage.

* See "JOURNAL," Feb. 18, p. 420. † *Ibid.*, Vol. LXXVI., p. 1522.

APPLICATIONS FOR LETTERS PATENT.

3293.—HELPS, G., "Anti-vibrating fittings for incandescent and other gas-lights." Feb. 10.
3299.—TOWNSHEND, E., "Brackets and like fittings for gas." Feb. 10.
3311.—HUGHES, T. V., "Acetylene lamps." Feb. 10.
3343.—BOULT, A. J., "Gas-generators." A communication from G. Viarme. Feb. 10.
3363.—SIEVERTS, W. H. A., "Gas-burners." Feb. 10.
3381.—EWAN, T., "Manufacture of cyanogen compounds." Feb. 11.
3387.—WILSON, J., "Gas-irons." Feb. 11.
3444.—SCOTT-SNELL, C., "Self-intensifying pressure lamps for incandescent gas lighting." Feb. 11.
3448.—LEMP, H., "Burner-regulators." Feb. 11.
3481.—COLLIN, G. W., and NICHOLLS, W. S., "Acetylene gas-machines." Feb. 11.
3492.—SIEMENS BROS. AND CO., LTD., "Filtering liquids and treating them with gases." A communication from Siemens and Halske Aktien Gesellschaft." Feb. 11.
3538.—SMITH, J. A., and DICK, M. & D. C., "Burners." Feb. 12.
3548.—M'QUINN, J. T., "Incandescent mantle suspenders and draught protectors." Feb. 12.
3563.—WELCH, C. K., "Internal combustion motors." Feb. 12.
3578.—GLENN, C. A., "Tool for drilling and tapping at one operation." Feb. 12.
3609.—VIGREUX, C. A., and BRILLIE, L. V., "Governors for gas supply and like apparatus." Feb. 12.
3638.—BOGAERD, C., "Apparatus for heating with gas, &c." Feb. 12.
3641.—WARREN, W. P., "Acetylene generators." Feb. 12.
3643.—WARREN, W. P., "Production of acetylene gas." Feb. 12.
3672.—TEE, H., "Lighting gas-lamps." Feb. 13.
3685.—MITCHELL, F., "Carrying the chimneys and shades of gas-fittings." Feb. 13.
3739.—GORDON, J. C., "Caulking pipes and indicating the position of leaks." Feb. 13.
3777.—KING, C. W., "Construction of devices to be illuminated by gas." Feb. 14.
3783.—BOWMAN, F. E., "Gas-producing plant." Feb. 14.
3801.—COOPER, H., "Gas and oil engines." Feb. 14.
3826.—DARBY, W. & I., "Cooking-ovens to act in conjunction with bunsen or other burners." Feb. 14.
3902.—QUIN, D. J. M., and BARCLAY, M., "Taps or cocks for gas and other pipes." Feb. 15.
3915.—TOURNIER, V. C., "Gas and oil engines." Feb. 15.
3945.—LEMAIRE, L., "Gas-generator." Feb. 15.
3952.—CARLSON, S., "Cleaning device for illuminating apparatus." Feb. 15.

Explosion at the Barrow-on-Humber Gas-Works.—While some workmen were engaged in examining the retorts at the Barrow-on-Humber Gas-Works, on Monday last week, an escape of gas occurred, which, coming into contact with a light carried by one of the men, caused an explosion. A bricklayer and a stoker sustained severe burns about the head and arms; but they were at once medically attended, and are going on satisfactorily. The Manager (Mr. W. F. Schofield), who was present, escaped with a slight singeing.

The Gas-Works Seizure at Bandon (Co. Cork).—In accordance with the intimation appearing on p. 444 of last week's "JOURNAL" (into which, however, a printer's error crept with regard to the name of the town), the Sheriff's auctioneer on Monday, the 17th inst., held a sale at the Bandon (Co. Cork) Gas-Works, when he disposed of 300 tons of coal, a quantity of tar, &c., in consequence of the failure of the Town Commissioners to pay the balance of a judgment claim of £450, due to Mr. Sherlock, Sessional Crown Solicitor. It is reported that, the Board being in a very embarrassed financial condition, liquidation will probably be the next step. That night the town was in darkness; and much inconvenience is naturally being felt by the consumers—especially by those having gas-engines fixed for business purposes.

Fire at the "Guaranty" Mantle Works.—A serious fire occurred on Balham Hill, yesterday week, at premises used as a manufactory and warehouse by the Guaranty Incandescent Mantle Company. The basement contains two rooms, one used for mixing chemicals, and the other for packing; the latter being occupied entirely by girls. The fire originated through the breaking, in the mixing room, of a bottle containing a mixture of a highly inflammable character. The fumes reached the adjoining room, where a gas-stove was used for heating purposes; and the basement became a mass of flames. In the upper part of the building the partners and a number of employees were at work, and, the alarm being raised, all the occupants were got safely out, with the exception of those in the immediate vicinity of the conflagration, some of whom were burnt about the face and hands. In his official report Captain Wells states that a building of one, two, and four floors, about 40 feet by 40 feet (used as manufactory, offices, and stores), was nearly burnt out. The structure was insured; but the loss of the contents, which were also insured, is not covered.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Wear and Tear and Income-Tax Assessment.

SIR,—With reference to the interesting letter of Mr. H. Tobey, of Malton, and your leaderette in the "JOURNAL" for Feb. 18, it may interest your readers—especially those in charge of works belonging to local authorities—to know that for many years at Stafford they obtained a reduction of 1 per cent. upon the capital invested in the gas undertaking on which income-tax was not chargeable. This was allowed for a number of years by the Local Surveyor of Taxes and the Commissioners; but one year it was disallowed by the Surveyor, and only the amount actually expended that year was allowed upon appeal before the Local Commissioners.

The next year appeal was made to the Special Commissioners; and upon presenting an account extending over a number of years—giving the sums credited and expended on renewals, &c., and charged to a depreciation fund account—the Commissioners decided that a deduction of 1 per cent. upon the capital of the undertaking appeared to be a reasonable annual charge against revenue, and allowed the claim. This still holds good.

Each year, before the profits are apportioned, a sum equal to 1 per cent. upon the capital expended on fixed plant account is carried to a depreciation fund; and the cost of any renewals or extraordinary repairs during the year are charged to this fund. The establishment of a depreciation fund in connection with municipal gas undertakings—whereby a fixed sum, varying with the capital expended, is charged each year to a separate account—is well worth consideration, as it prevents violent fluctuations of profits arising from cost of renewals, or extraordinary repairs necessary to be carried out when perhaps the undertaking can least afford it.

In only one instance do I know of a gas company who possess this power; but it might be copied by other companies with advantage if the necessary statutory powers can be obtained.

J. FERGUSON BELL.

Derby, Feb. 21, 1902.

Coke and Coal Handling Plant.

SIR,—In reply to Mr. J. Ferguson Bell's letter in your last issue, my article was on the Zurich plant, and did not embrace a criticism on types of coke-conveyors not installed there. At the same time, I showed an alternative scheme, and as the one panegyrized had proved successful elsewhere, I did not refer to others, some of which my father tried years ago.

I am not yet convinced of the utility of the De Brouwer conveyor for large works, where a breakdown or hitch might cause great inconvenience—sufficient to counterbalance the fitful serviceableness of the machine. My remarks might be extenuated by the interposition here of my views on the suitability of the conveyor for light duty—such, for instance, as that it would bear in a small works requiring a short length. But as regards large installations, I prefer your readers should refer to the unbiassed opinion expressed by Mr. Hack, as reported in the "JOURNAL" for Oct. 28: "He admired the De Brouwer conveyor for its simplicity, and there was not a more effectual one than this [Nechells] when started and for some time after. But the wear and tear on it was more than in the case of any other conveyor he knew of." At that time, his plant had only worked a few months.

One point I have not lost sight of in the De Brouwer conveyor is that it was put on the market by the progenitor when gas engineers would not give a thought to the adoption of hot-coke conveyors; and although it was owing to the intrepidity of Continental engineers that the progeny got beyond the infantile stage, great credit is due to the British engineers who fostered it in its youth, and so made the introduction of coke-conveyors a matter for consideration, and thus enabled other designs to be tried.

Mr. Bell says that so far the repairs have been "practically" *nil*. The adverb can only signify that repairs have been necessary in the five months the conveyor has been at work. If such repairs were in the moving parts, and some of these parts were worn sufficiently to require repairing, the remainder of similar parts must be approaching the period when repairs will be necessary. A coke plant should not require repairs in the first five months; and the fact that Mr. Bell "anticipated" even more wear and tear shows that he was aware of its weakness before putting in the plant, but expected the benefits would counteract the defects. At the time the Litchurch plant was put in, other designs had not had time to show of what they were capable in the way of efficient coke-handling or lasting qualities.

One of the leading men in the profession once hit the nail on the head when he said that most engineers calculated the upkeep cost on the expense of renewals for the first year—not taking into account the fact that at first all parts are new. In later years, however, only the renewed parts are in the best condition; so that when the quicker wearing parts again require replacing, the original unrenewed and stronger parts at the later date may also require repairing.

ARCH. J. S. B. LITTLE.

Smethwick, Feb. 22, 1902.

Exhibitions and Interviewing.

SIR,—Regarding the question raised in an editorial paragraph in the last "JOURNAL," as to the house-to-house visitation of consumers, I might say that I have found this system very beneficial, inasmuch as in the year 1901 my Company obtained from 500 to 600 additional orders for gas, including cookers, principally by means of canvassing. I am still having the district canvassed, and good work is being done.

R. W. EDWARDS.

Aldershot, Feb. 20, 1902.

[A "Communicated Article" on the subject, by Mr. F. W. Cross, of the Lea Bridge Gas Company, appears on p. 480.—ED. J.G.L.]

Incandescent Burner Maintenance.

SIR,—In reading through your leaderette in the last number of the "JOURNAL," I was somewhat surprised to see you describe the scheme for maintenance of incandescent burners proposed by Mr. S. Y. Shoubridge as original and novel, and further that no one could tell how it would answer.

About two years ago, I had the matter of maintenance under consideration, and realized that, if we undertook to replace mantles in an inclusive charge, difficulties would be sure to arise, owing to accidents, carelessness of servants, and other causes—the customer having absolutely no interest in the careful use of mantles. I therefore decided to have the enclosed circular printed, and sent round to our customers. The results have been most gratifying. I estimate that we have about 50 per cent. of the incandescent burners in this town under our care; and the fact that no one has yet given up our scheme, and that we are constantly adding new customers, is proof that the public are satisfied with our methods of doing the work.

I believe there are several gas companies maintaining incandescent burners on much the same lines as ourselves; and I lay no claim to originality of the scheme. It will interest your readers to know that, during the year 1901, the average number of mantles renewed amounted to a fraction under 1¼ per burner for the whole twelve months. I may add that, if there are more than twelve burners in the same buildings, we only charge ½d. per burner per month.

J. H. CORNISH.

Bridport, Feb. 20, 1902.

[CIRCULAR ENCLOSED.]

"IMPROVE YOUR LIGHTING."

INCANDESCENT LIGHTS.

It is a well-known fact that many incandescent burners do not give the light they should, although consuming the same quantity of gas, because of dust accumulations filling up the small burner holes, and from want of proper adjustment.

THE BRIDPORT GAS COMPANY, LIMITED,

are prepared to send a competent fitter to any part of the town once a month, to re-adjust, clean, and put right incandescent burners, for the nominal charge of 3d. per burner per quarter.

If new "C" mantles are necessary, they will be fixed at these periodic visits for 9d. each mantle.

The Company believe that the interests of the consumers warrant them in taking this step, and hope that a large number of burners will be entrusted to their care.

SIR,—As the upkeep of incandescent burners seems to be now attracting a good deal of attention, I am sending you herewith some figures relating to two typical installations which my Company have kept in order for twelve months at 3d. per burner per quarter, for cleaning and inspection; the owners of the installations paying for such additional mantles, chimneys, and props as they desired.

These are very good samples of houses, as one is occupied by one of the civic leaders of the borough who last year entertained at his house a good deal of company, and the other is a gentleman who owns a billiard table and, in addition, is very fond of company. You will see from the figures how little is the actual cost of upkeep through the whole of the year.

MAINTENANCE.

Feb. 19, 1902.

[ENCLOSURE.]

Incandescent Burner Maintenance for the Year 1901.

Installation.	Total Number of Burners.	No. of Mantles used.	Average No. of Mantles per Burner.	No. of Chimneys.	No. of Props.
No. 1	30 (22 "C" Pattern) (8 "Kern")	32	1·06	8	2
No. 2	34 (23 "C" Pattern) (11 "Kern")	70	2·06	1	2

Installation.	Cost of Labour.	Cost of Renewals.	Average Cost per Burner per Annum for Labour and Renewals.
No. 1	£1 10s.	£1 4s. 2d.	1s. 9·66d.
No. 2	£1 14s.	£2 4s. 5d.	2s. 3·67d.

Air Gas for Isolated Places.

SIR,—Referring to the article which appeared in the "JOURNAL" this week on the above subject, and in which mention was made of our atmospheric gas system, I should like to make two or three remarks upon the points raised.

Of course, to obtain the full duty of 125 candle power from a "Gem" burner, it is necessary to burn the gas at a high pressure—at about 6 inches water gauge. Although at this pressure a large volume of the enriched air is passed by the burner, the flame is comparatively a small one, and the heat intensity consequently high. This probably is the chief reason for the high candle power, though possibly the chemical nature of the gas may be a factor.

It is a matter of some difficulty to include a fair allowance for interest on outlay and maintenance in stating the cost of running, as the first item would differ with the size of the plant used, and the second with the amount of care taken by the consumer; but I find the actual cost for oil and water in our own installation is ¼d. per burner-hour.

The gas containing only 1·86 per cent. of combustible matter will only explode under compression; hence, while suitable for gas-engines, there is no danger of exploding the gas under standard conditions of pressure.

LIONEL W. STANLEY,
Manager, Atmospheric Gas Company.

Leeds, Feb. 20, 1902.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills :—

Bills read a second time : Bradford-on-Avon Gas Bill, Consett Water Bill, Weardale and Shildon District Water Bill.

Petitions have been presented against the following Bills : Margate Corporation Water Bill, Menai Bridge Urban District Council Bill, Rickmansworth Gas Bill, Wrexham Water Bill.

HOUSE OF COMMONS.

Monday, Feb. 17.

LONDON WATER BILL.

Sir S. SCOTT asked the President of the Local Government Board whether he was prepared to insert in the London Water Bill a clause protecting the consumers of water in the area of the Metropolis supplied by the West Middlesex Water Company from the loss of the discount on their water-rates to which by law they are now entitled.

Mr. LONG replied that under clause 35 of the Bill the scale of charges enforceable by the Company would continue in force until repealed, altered, or superseded. The powers of the Water Board in this matter would be precisely similar to those of the Company at the present time, and he did not propose to insert in the Bill any special provision on the subject. He did not express any opinion as to the legal right of the consumers; but no such right now existing would be taken away by the Bill.

The following further progress has been made with Bills : —

Bills read a second time and committed : Bromley Gas Blll, Commercial Gas Bill, East Worcestershire Water Bill, Halifax Corporation Bill, West Gloucestershire Water Bill, Wolverhampton Corporation Water Bill.

Petitions have been presented against the London Water (Purchase) Bill by the Corporation of London, the Hertfordshire County Council, and the Sutton District Water Company; and against the West Ham Gas Bill by the Barking and Ilford Gas Companies.

The Abercarn Urban District Gas Bill, Chard Gas Bill, Shepton Mallet Gas Bill, Fareham Gas Bill, Limpsfield and Oxted Water Bill, Newport Corporation Bill, and the Ticehurst Water Bill have been referred to a Select Committee, consisting of Mr. Caine (Chairman), Col. Long, Mr. C. P. Allen, and Mr. J. F. Hope; to meet to-day.

The Broadstairs Gas Bill, Bromley Gas Bill, Bedford Corporation Water Bill, East Worcestershire Water Bill, Higham Ferrers and Rushden Water Board Bill, North Warwickshire Water Bill, Reading Gas Bill, and the Wolverhampton Corporation Water Bill have been referred to a Select Committee, consisting of Sir Savile Crossley (Chairman), Mr. Tennant, Captain Jessel, and Mr. Soares; to meet on Thursday.

Colonel Lockwood (Chairman of the East London Water Company) has given notice that on the second reading of the London Water Bill he would move: "That no Bill for the transfer of the Metropolitan Water Companies will be satisfactory which does not provide for the compensation being ascertained and paid in the manner recommended by the Royal Commission presided over by Lord Llandaff, and as hitherto adopted in all cases where any property or undertaking is acquired for the public benefit."

LEGAL INTELLIGENCE.

THE WELSBACH LITIGATION.

Last Friday, application was made to the Lord Chief Justice that the two test actions on the 1893 Welsbach Company's patent might be taken together. Mr. Astbury, K.C., said his Lordship was no doubt aware that many actions had been brought on this patent, and the Court of Appeal had recently expressed a strong opinion that the matter ought to be litigated once for all. Two actions were pending—one against the United Chemical Works, and the other against the Voelker Company. His Lordship had already refused to grant an injunction against a purchaser from the United Chemical Works, and the Court of Appeal suggested that all the cases should stand over to abide the result of the action which was to be tried. As the question of validity was raised in both suits, he asked that they should come on together. The attack upon the 1893 patent was this—that the Welsbach Company's predecessors had made and sold mantles in 1891, and Letters of Request had gone out to Vienna and elsewhere in Austria in order to get evidence as to this, as the present Directors refused to answer interrogatories as to what they did as Directors of a previous Company. In the action against the United Chemical Works, the evidence under the Letters of Request had been returned, but not in the other action. Mr. Walter said he understood the Letters of Request in the Voelker case had not been sent out. Mr. Astbury said they were filed months ago, but, owing to the action of the Welsbach Company, they had been kept back. The evidence in the first case was not so wide as in the second; and if the action against the United Chemical Works was tried first, the Voelker Company would still require to have their case tried out. Mr. Walter strongly opposed any further delay, and asked that the action against the United Chemical Works should be tried, as the evidence was now complete. His Lordship said both cases might be put in the paper on the same day, and the Judge would deal with them; but he could not delay the trial of the first action because the evidence was not complete in the second.

In the City of London Court on Monday last week, before Judge Lumley-Smith, K.C., an action was brought by Mr. W. H. Hales, solicitor, of Clifford's Inn, to recover £46 14s. 6d. from Mr. W. P. Bellerby, of Hutton Moor, Stockport, for professional charges incurred in "fighting the Welsbach Company" at defendant's request. The plaintiff said the defendant, in January last year, called upon him, and asked him to contest certain matters with the Welsbach Incandescent Gas-Light Company, Limited. The defendant had formed two Syndicates—the Vulcan and the Sunbeam. These Companies imported incandescent mantles from Germany, and action was taken by the Welsbach Company against the Vulcan Company. Applications were made for injunctions to restrain the Vulcan Company from selling mantles which were brought over from Germany. The defendant told the plaintiff that he had a contract with a Berlin firm for the sale of their mantles, and that he had promoted the Vulcan Company to protect himself against any claims and proceedings by the Welsbach people. Actions were brought by them, and injunctions were granted, all of which were defended by the plaintiff in due course. When the time came for him to be paid, the defendant said he must look to the Vulcan Company for payment. The defendant said that he employed plaintiff on behalf of the Directors of the Vulcan Company, and the plaintiff ought to look to them for payment. Defendant had not put any money into the Syndicate, but he was to receive 6000 fully-paid shares. The arrangement, however, did not go through. The Syndicate borrowed £400 or £500; and as the mantles were paid for in cash, no more capital than this was wanted. All the instructions given to the plaintiff were sent at the instance of the Directors of the Syndicate. The Judge said the defendant had not put any money into the concern, and the other people had subscribed for only one share each. He believed the plaintiff's evidence, that he was to look upon the defendant as his client; and judgment would be for the plaintiff for the amount claimed.

WEST BROMWICH POLICE COURT.

Thursday, Feb. 20.

(*Before a* BENCH OF MAGISTRATES.)

Alleged Falsification of Accounts by a Gas-Works Clerk.

There was a further hearing to-day of the charge against *Joseph Turner*, a clerk at the Swan Village Gas-Works of the Birmingham Corporation, of falsifying accounts. The details of the case were reported in last week's "JOURNAL," p. 424.

Mr. REAY NADIN prosecuted; Mr. J. CLARK defended.

Mr. *G. R. Mackintosh*, Chief Clerk at the Swan Village Works, stated that he made up the wages-books with the assistance of the prisoner every Thursday. He called out the details, and accused usually replied whether these corresponded with his books. During dinner time, the books remained on the office desk. With respect to the allegation that prisoner inserted the figure "1" in the pounds column in front of an item of 7s. 9d. due to a workman named Bird, witness thought this had been done in his absence during the dinner hour, taken out after he had checked it, and again reinserted, so that the books would appear all right when audited in Birmingham.

In cross-examination, witness said prisoner had access to all the books. It was witness's duty to assist in paying the men; but he had asked Turner to do so, and the latter never objected. He had heard of him going to the works on Sunday, but was not aware that he had been in the habit of doing this for years. There was a junior clerk named Burton in the office; but it would be impossible for the latter to get at the cash when prisoner was there.

A. J. Burton, junior clerk, said Turner had been in the habit of going into the Superintendent's office at the works with the books on Fridays, the Superintendent being out at the time. He knew prisoner had frequented a public-house close to the gas-works a good deal.

W. H. Baird, a fitter, said on Jan. 9 he was paid 7s. 2d.; and on Jan. 16, 17s. 10d. It was false if the wage-book showed him as having received £1 7s. 2d. and £1 17s. 10d. respectively.

Several workmen were called to say they only received a certain sum, though the wages-book showed them entitled to a larger amount.

A. Hayward, a shunter, deposed that prisoner had been in the habit of visiting the works pretty regularly on Sundays for the past nine months. Somewhere about last Christmas, witness saw him with a large book open in front of him in the office.

Mr. *W. Powell*, Chief Cashier to the City Gas Department, said that as the result of an examination of the books, he found the falsifications commenced on Sept. 7, 1899.

Prisoner, who pleaded not guilty, and reserved his defence, was committed for trial at the next Quarter Sessions; bail being allowed, himself in £80 and two sureties of £50 each.

Claim under the Employers' Liability Act.

At the Colchester County Court, last Tuesday, William Pike, labourer, sued the Colchester Corporation under the Employers' Liability Act for £180, compensation for injuries received while digging a trench for the Water Department. The case was withdrawn; the Corporation intimating that they would pay plaintiff half-wages for the time during which he was incapacitated from work. The accident to which the claim referred occurred last August, when Pike was engaged laying a new main to Old Heath. He was in the trench, when one side gave way; and the earth falling on him broke his leg.

Question as to Laying Pipes for Water Supply.

In the Chancery Division of the High Court of Justice a few days ago, Mr. Justice Kekewich had before him the case of *Harford v. Mayor and Corporation of Lampeter*. Some time ago, arrangements were made by which plaintiff sold certain land, including some springs, to the Corporation, for the purpose of supplying the town of Lampeter with water. There was a clause by which the defendants were to supply, if required by the vendor, sufficient quantities of water to certain cottages at Henfeddern, within 150 yards of the line of pipes. The question between the parties was whether the obligation to supply carried with it one to lay service-pipes from the mains to the houses. His Lordship held that the Corporation were bound to supply the water, but that the vendor must take it from the mains to the cottages.

MISCELLANEOUS NEWS.

DEVONPORT GAS-WORKS PURCHASE.

The Arbitration Award.

Mr. James Mansergh, M.Inst.C.E., the Umpire appointed to determine the sum to be paid by the Devonport Corporation for the undertaking of the Devonport Gas and Coke Company, has given his award. The matter was argued on Dec. 9 and 11 last; Mr. Corbet Woodall, M.Inst.C.E., being Arbitrator for the Company, and Mr. Thomas Newbigging, M.Inst.C.E, for the Corporation. The proceedings were reported in the "JOURNAL," Vol. LXXVIII., pp. 1612 and 1736. The award is dated Feb. 18, and was received by the Corporation on Friday last.

After the customary recital, Mr. Mansergh says: "I do award and determine that the sum of £149,570 is the amount of the price or consideration to be paid by the Corporation to the Company for the purchase by the Corporation from the Company of the said undertaking; and I do declare that, in the said sum of £149,570 so to be paid by the Corporation to the Company, there has been included, in addition to the amount awarded in respect of dividends, a further sum equal to the amount of all debts and liabilities (other than the mortgage debt of £15,000) *bonâ-fide* incurred by the Company, and which under the provisions of the Act are to be borne and paid by the Company out of the reserve fund."

In order to explain the latter portion of this finding, and arrive at the exact sum to be paid for the undertaking, it is necessary to refer to the agreement between the Company and the Corporation, which was embodied in the Act of last session, under which the transfer takes place. One clause of this provides that "the existing reserve fund of the Company shall remain the property of the Company;" the Company paying their own costs both in connection with the Bill and in connection with the proceedings taken against them at the Devonport Quarter Sessions. Another section was as follows: "All debts and liabilities, other than the mortgage debt at the time of the transfer, and due from or payable by the Company, shall be paid by the Corporation; and the Company shall indemnify the Corporation against the same, provided that the Company shall be entitled to receive the maximum authorized dividends on the capital of the undertaking from the date on which dividends shall last have been paid up to the transfer." It was further provided that "the sum to be paid by the Corporation to the Company as the price or consideration for the purchase shall be included in the amount awarded in respect of dividends, and a further sum equal to the amount of debts and liabilities." In course of the hearing it was decided that the amount of the debts and liabilities should be a sum agreed upon between the accountants on each side—Messrs. Lass, Wood, and Drew, for the Corporation, and Messrs. Cash, Stone, and Co, for the Company. They agreed that the amount payable was £39,457; and this sum deducted from the award, leaves £110,113 as the net amount to be paid for the undertaking. The valuation placed upon it by Mr. W. A. Valon and Mr. Robert Porter for the Company was £148,926—namely, 30·77 years' purchase of the maximum dividends £4400, or £135,888, *plus* 10 per cent. for compulsory purchase, £13,538. For the Corporation, it was contended by Mr. E. H. Stevenson that the price should be 25 years' purchase, or £110,000, less £23,044 for deficiencies of works—a total of £85,956. Mr. W. R. Chester, who estimated the value of the deficiencies at £22,400, placed the value at £87,600. The capital of the Company is £65,000, of which £50,000 is in 10,000 shares of £5 each; the balance being a mortgage debt.

Although the award bears the date of Feb. 18, the transfer is by agreement to take effect as from Jan. 1. The Company, however, remain in possession of the undertaking until the money is paid, and will receive interest at 4 per cent. upon the purchase-money from Jan. 1 until the actual date of payment.

One of the immediate necessities of the Corporation will be a somewhat extensive scheme of reconstruction and reorganization of the works. It was with the object of raising capital for this purpose that the Company went to Parliament. The Corporation in their Bill have taken power to borrow money to carry out the necessary works; and Messrs. Stevenson and Burstal, in conjunction with Mr. Corbet Woodall, have been instructed to report upon the condition of the works and what is necessary to modernize them.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Tuesday—Mr. J. E. TINNE, the Deputy-Chairman, presiding, in the absence, through illness, of Sir Edward Lawrence.

The report was to the effect that the Directors, having had submitted to them an estimate of the profits for the half year ending Dec. 31, recommended the proprietors to declare a dividend for the six months of 5 per cent. on the ordinary consolidated "A" stock, and of 3½ per cent. on the 7 per cent. "B" stock. The Directors also recorded with deep regret the loss to the Company of the valuable services of the late Mr. Thomas Comber.

The CHAIRMAN, moving the adoption of the report, said the price of gas remained the same. They were working on slightly cheaper materials than was the case at the corresponding period last year; and the result would have been considerably better than it now was, had it not been for the fall in the price of residual products, such as tar, ammoniacal liquor, and coke. Still, with all that, instead of having, as the Chairman did last August, to tell them of a falling off in consumption of over 1 per cent., he could say that up to the end of December they had reversed the process, and had shown an increased consumption of something like 2¼ per cent. The last six months of the past year had been free from unusually cold or foggy weather; and therefore the increase had not been a very large one. As gas producers or gas shareholders, they always prayed for cold, fog, and bad weather. During the past month their most ardent wishes had been satisfied; and last week the consumption of gas had shown an increase of over 12 per cent., which was highly satisfactory. It was said "Happy is the country that has no history;" and that might be applied to the Liverpool Gas Company. They had been free from undue trouble or anxiety, and were able to declare the statutory dividends. They had produced an excellent light at a moderate cost; and the Board had worked with the staff, both engineering and clerical, in complete harmony. Their sole object was to satisfy the consumers; and he trusted that when next the bills were sent out, if the consumers found their accounts slightly heavier, they would remember that January and February had been unusually cold months, and that probably they had consumed more of the excellent gas the Company supplied.

Mr. JAMES LISTER seconded.

Alderman STOLTERFOHT, referring to the question of water gas, said it seemed to be almost impossible to make any impression on the Directors with regard to this matter. Things had now come rather to a crisis, because their chief customers—the Corporation of Liverpool—were tired of making representations. Individual consumers had done so without any effect; now the recommendation of the Lighting Committee of the Corporation was that they should authorize a deputation to go to the Home Office, asking for the interference of the Department in view of their recommendations having been ignored. He thought it would have been very much better if the Directors had met the various complaints which had been made. The only reply they made seemed to be that they did not see their way to going to the expense of the alterations that would be necessary; but he would point out that the cost of the alterations would fall upon the consumers. Having had conversations with Sir Edward Lawrence, he thought it would be very much better if the Directors were to take the matter boldly in hand, and see what alterations were required to bring themselves into conformity with the recommendations of the Select Committee appointed by the Government. It would be better to do it themselves than have their hands forced by an order from the Home Office.

The CHAIRMAN said that, in the absence of Sir Edward Lawrence, he would only say that the last letter from the Gas Company to the Corporation was, he thought, very courteous; and it also conveyed an intimation that they were anxious to study the interests of the public, and to do what was right so far as they could. But they hesitated about incurring expenditure upon a modification of gas making, or in reverting to the production of larger quantities of coal gas, before they knew what legislation there might be on the subject. Otherwise they might be throwing away very large sums to no purpose. The first people to blame them for useless expenditure would be the consumers, because, as Alderman Stolterfoht had pointed out, they would have had to pay for it. In the absence of the recommendation which Alderman Stolterfoht had mentioned, and which the City Council had not yet confirmed, perhaps it would be indiscreet of him to say any more. It would be better to await some further communication from the Corporation. He was most anxious, on behalf of his colleagues, to assure the public that at all times it was the desire of the Directors to treat the city authorities in the most conciliatory manner possible.

Mr. LISTER pointed out that the Company had adhered strictly to the recommendations of the Departmental Committee, and had never used more than the amount of carbon monoxide which was allowed.

The ENGINEER (Mr. William King): That is so.

The motion was then passed, as was also another declaring the statutory dividends.

A vote of thanks to the Chairman concluded the proceedings.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual General Meeting of this Company was held last Wednesday—Sir W. H. STEPHENSON in the chair.

The report presented by the Directors showed that the revenue in the twelve months ending Dec. 31 was £387,065, and the expenditure £324,113; leaving a balance of £62,952. Adding this to the balance of undivided profits, £21,648, a total of £84,601 was produced. After payment of the interest on the debenture stock and the interim dividends, the Directors recommended that out of the balance a dividend at the rate of 4 per cent. per annum on the preference stock and of £4 7s. 6d. per cent. per annum on the ordinary stock should be paid. These payments would absorb £76,204, and leave £8397 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, referred to the unopposed passage of the Company's Bill in Parliament during the year, as a satisfactory proof that they possessed the confidence of the local authorities. By the Act, their capital powers were extended; the ordinary stock had been doubled, and the dividend halved; and the preference stock had been altered from 5 to 4 per cent. Then they had been empowered to supply gas to an extended area, under condition that they did not do so until they began to manufacture gas at their new works at St. Anthony's. The qualification of Directors had been raised by the Act from a holding of £400 to £2000. As to the revenue of 1901, they received from all sources £387,065, as compared with £383,683 in the previous year. Their expenditure had been £324,113, as against £291,481. The gross profit in 1901 was £62,952, as against £92,202 in 1900. Last year he told them that the reduction of 1d. in the price of gas, coupled with the high cost of coal, would probably exhaust the £21,648 brought forward. In actual experience, he was glad to say, this had not happened, for they were now carrying forward £8397. Coals had been the chief factor in the additional expenditure, partly because they had carbonized more, and partly from the fact that in the first half of 1900 the Company received the benefit of the still lower rates of the contracts completed in June of that year. The total carbonized in 1901 was 283,561 tons, as compared with 269,027 tons in 1900. The cost was 13s. 6·3d. per ton, as compared with 12s. 3·8d. in 1900, 8s. 8·7d. in 1899, 7s. 7·6d. in 1898, and 6s. 9·8d. in 1897. Residuals, he was sorry to say, had shown a considerable falling off. For coke, breeze, tar, and sulphate of ammonia, they received 7s. 11d. per ton of coal carbonized, as against 9s. 3d. in 1900. Manufacturing charges had been materially

reduced by the introduction of machinery in the retort-houses for charging and discharging. A considerable saving had been effected; and when the whole of their premises were equipped, this saving would be greater still. Last year the cost per ton of coal carbonized for wages, salaries, purification, handling coal, and repairs, was 6s. 4·9d., as against 6s. 9·4d. the year before. The credit balance of capital account on Dec. 31, 1900, was £27,833; and they had raised by debenture and ordinary stocks £120,772, which gave a total of £148,606. They had expended £157,183 upon new buildings and machinery at Elswick and Redheugh, the new holder at St. Anthony's—which was practically ready for use—distributing mains, stoves, meters, &c., which left a debit balance on capital of £8578. There had been during the last six years such an increased consumption of gas that it had been necessary to lay 134½ miles of mains in extensions and 16 miles in renewals. Last June, a show-room of modern gas appliances was opened underneath the offices, and had been a great success. Some 7500 people had visited it. During the year, 1310 ordinary cooking-stoves had been fixed, and 4917 stoves in connection with automatic meters. The demand for the prepayment installations was enormous, and they could not keep pace with it. Up to the present, 5726 had been fixed; and the collectors had already brought in one million copper coins. Incandescent lighting had become so general that it was quite possible it might be to the advantage of the Company to take up the question of maintaining the burners and mantles. Some companies were doing this already—such as Sheffield and the South Metropolitan—and others were considering it. Some people, no doubt, would think this a mistaken policy; but he held that anything which tended to popularize gas and make its consumption more general, would, in the long run, be not only beneficial to the consumer, but to the Company. If for a small sum per quarter they could upkeep the mantles and clean and keep the burners in order, it seemed to him that, with plenty of trade, it would pay the Company to enter upon it. Dealing with the recent announcement that a further reduction of 1d. per 1000 cubic feet in the price of gas would be in operation from the beginning of this year, the Chairman pointed out that 2s. 1d. per 1000 cubic feet, with the discount of 10 per cent., made the charge only 1s. 10½d.; and with one exception theirs would be the cheapest gas in England. To the large consumers who received 15 per cent. discount, it would be only 1s. 9½d. In conclusion he sketched the history of gas lighting in Newcastle from the beginning in 1817. Rather oddly, the Newcastle Fire Office was the first authority to manufacture and supply gas. There were no meters at that time; and consequently the charge made was per burner per annum. One jet cost 10s. 6d. a year. But it had to be turned off at 8 o'clock at night; so folks evidently kept good hours then. If it was kept alight till 9 o'clock 13s. had to be paid; if till 10 o'clock 15s.; if till midnight 19s. The next striking and amusing feature of the prospectus (reprints of which had been procured for distribution among shareholders at the meeting) was that "Innkeepers and others whose hours of lighting are uncertain, may be accommodated by special agreement with the Company." Until 1830, there were no meters; and inspectors had to go round to see that customers were obeying their agreements to turn the lights out at particular times. In 1830, the first Company—the Newcastle Subscription Company—was formed, with a capital of £30,000. It took the position of the Fire Office, established works at Sandgate, and kept in operation for eight years. There was commenced in 1838 the Newcastle Union Gas Lighting Company, who purchased the old one, and the works in Gateshead, erected in the interests of Mr. Grainger. They had a capital of £67,000 actually invested; and they created new capital of £160,000 with £50,000 loan. The Elswick Gas-Works were established in 1859, and the old works at Sandgate and the Manors closed. In 1863, another Company—the Newcastle Equitable—was started in opposition; the promoters including two of the present Directors, Mr. W. B. Wilkinson and himself. The Union Company had no parliamentary powers, so the Equitable Company went to Parliament and obtained an Act. The old Company then found they were at the mercy of the new one, and agreed to take over the parliamentary powers and promote a Bill in Parliament themselves. This undertaking was carried out; and the present Company was thus formed. The capital now authorized was £3,557,897, of which there were unexhausted powers of £1,234,558, which should suffice for many years yet. The first Gas Company had a revenue of £8895. Now it was £387,066. The price of gas, which was 8s. 6d. then, was now 2s. 1d., less 10 or 15 per cent. The consumers were then 2200, and now 47,339; the coal carbonized was 5660 tons, as against 283,561 now; and the public lamps 1050, as compared with 11,112 now. All this meant progress; and, notwithstanding the opposition of two Electric Light Companies, the consumption was going up by leaps and bounds.

Mr. J. J. Gurney seconded the motion; and it was carried.

A resolution was unanimously passed to increase from £800 to £1000 per annum the salary of the Secretary, Mr. Thomas Waddom.

An extraordinary meeting was subsequently held, at which sanction was given to increases of £50,000 each in the ordinary stock and 4 per cent. preference stock and the issue of 3½ per cent. debenture stock.

In connection with the interesting historical particulars given by the Chairman at the meeting, a statement has been officially compiled, showing the increase in the consumption of gas in the district of the Company. It gives the quantity of gas sold in distinct years over a long period; the years taken being those in which fresh Acts of Parliament added to the powers or area of the Company. The following is a summary of the statement:—

Year.	Period. Years.	Gas Sold. Millions.	Increase. Millions.	Ave. Inc. Millions.
1838	—	17	—	—
1863	25	240	223	9
1867	4	355	115	29
1873	6	571	216	36
1879	6	811	240	40
1896	17½	2021	1210	69
1901	5	2714	693	138½

It will be seen from these figures that in the first period of 25 years the average increase was 9 million cubic feet yearly; and at each period given there has been a growth in the rate of the increase. For the past year the quantity of gas sold was 2714 million cubic feet, or 693 millions more than at the end of the preceding period. This increase is for five years at the remarkable rate of 138½ million cubic feet yearly.

TOTTENHAM AND EDMONTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Saturday, at the Offices, No. 639, High Road, Tottenham—Mr. Corbet Woodall in the chair.

The Secretary (Mr. James Randall) having read the notice convening the meeting, the report and accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said he was glad to meet the proprietors in the Company's new offices for the first time, and to say that the experience they had so far had in them showed they were admirably designed for the work. Architecturally they were an ornament to Tottenham, and they were of abundant size. It must be borne in mind that a grave alteration in the system of the Company was represented by these new offices. They had removed the whole of the distributory staff from the works to the High Road. It was a much more central place; and they had found that a day's work of their men on the distributing staff was now a much more satisfactory matter than it was when they had a long journey to the works in Willoughby Lane. It would be a matter of distinct reflection on the Board if, in a few years, it was found that, having made a departure such as this, the needs of the Company had already overtaken the provision. He thought this entry upon the new offices might well suggest some observations upon the growth of the business. During the past ten years, the output of gas from the works had increased by 120 per cent.; and the number of consumers in the same period had advanced by 250 per cent.—that was to say, ten years ago they had something between 5000 and 6000 consumers, while to-day they had more than 18,000. It was quite true that a large portion of these added consumers used a comparatively small quantity of gas per meter; and it had further to be remembered that every one of them involved an almost equal amount of clerical work and work in the distribution department as the larger consumer. Therefore, from the point of view of the clerical staff and of the distributory staff, it would be seen how enormous was the rate at which the business of the Company was growing. Perhaps it would be interesting, as a further illustration, to say that, in the first 36 days of this year, there was brought into the offices the equivalent of 10 tons of bronze coin from the prepayment meters. The mere handling of the coins from these meters was quite a formidable addition to the work of the Company. In Tottenham, they were face to face with the probability of a competition which had not hitherto been theirs. There was little doubt that, within a comparatively short time, the electric light would be introduced into the district. He had already said at these meetings that he thought it was a great mistake, and quite unnecessary, on the part of gas companies to disparage in any way the value of the electric light. They could quite well afford to see it come into the district, and not be afraid of its influence on their business. But, at the same time, it was their duty to see that the amount of inroad it made was as small as possible; and, therefore, everything they could do to popularize the use of gas among the consumers must be done, as was being done, and would continue to be done. With regard to one branch of lighting, he trusted that Tottenham and Edmonton would be spared from the introduction of electric light, as one knew it in London, for the purpose of public lighting. For less than one-third of the money that had to be spent on arc lighting, the streets could be made (and to a very large extent were made already) bright, attractive, pretty, and thoroughly efficient in the matter of lighting by means of gas, and, to his mind, much more effective. Turning to the accounts, he said he thought they required very few words from him to convince the proprietors that the result of the year's working had been thoroughly satisfactory. As they knew, the Company had, rather more than a year ago, to face a large increase in the cost of materials. The increase in the cost of materials in 1901, as compared with 1900, was something like £12,000. The Directors, as the proprietors were aware, deliberately refrained from raising the price of gas until the very last moment. They did not increase it until considerably after the period at which they began to pay the higher price for coal and oil; and when they did raise it, it was only by the small amount of 4d. per 1000 cubic feet, while the increase in London had been respectively 7d. and 6d. The Directors kept the increase on for the whole of 1901. The result was a contribution on the part of the consumers towards the increased costs, of something above £8000; and out of the reserves they had taken somewhere about £5000. So that they had divided between the proprietors and the consumers the extra cost to which the Company were subjected for materials. The result had been, as the proprietors knew, a reduction on the dividend of ½ per cent.—½ per cent. on 4½ per cent. was 11 per cent. of the dividend. He thought this arrangement was an eminently satisfactory one to both sides. It showed that, under the legislation which covered the operations of the Company, while they shared with the general public the advantage of improved prices for what they had to sell in the way of residuals, and lowered prices for what they had to buy in the way of materials, they also shared in the losses that were attached to the increased costs which were beyond the control of the Company. During the half year, those of the proprietors who had given attention to the accounts would see that the Directors had spent heavily on repairs and maintenance. He would not trouble them with the details of this expenditure. But he might say that, whereas the usual average cost would be something like 5d. per 1000 cubic feet of gas, it had been lifted in the half year to about 9d. Well, it would be seen that here was evidence that there had been no attempt to starve the works or to save money that could be profitably spent on the upkeep; but everything had been done that could be done to keep the works in the most efficient condition possible. He thought he could say very confidently that the prospect before the Company was a very encouraging one indeed.

The district continued to grow—not simply as a residential district, but there were gathering in their area a large number of manufactories the demand for gas for which was heavy. The Board had been discussing only that day the case of one factory where it would be necessary to lay down an 8 or 9 inch main, in order to supply the wants of that factory only; and, in the same area, there were a number of manufactories of considerable importance growing up. The efforts of the Directors had been, and would continue to be directed, to seeing that, while the business grew, the capital should not, at any rate, grow in greater proportion. He was glad to say that his colleagues were with him completely in their desire that the expenditure of capital should be watched minutely and carefully; and, while they would spend all that was necessary to uphold the works in line with the best models they had round about them, they would not spend a penny upon which they could not see the prospect of a fair return. They had large extensions now in hand, and they had others in preparation; but he believed the demand for gas would justify the expenditure for the whole. One word further with regard to the great advantage the Company had derived from the introduction of the use of carburetted water gas. At the time they introduced the manufacture of water gas, there was some question in many minds as to the advantage that would accrue from it. He might say that throughout they had found it distinctly to their advantage from the point of view of economy, as well as of efficiency of service. During the past half year, with oil at the comparatively high price of 3⅞d. per gallon, they had made their carburetted water gas, of high illuminating power, at a cost of 3d. per 1000 cubic feet less than the coal gas; and in the current year, at the contracts entered into for oil, the advantage would be still greater. In addition to the economy of carburetted water gas, there was an immense advantage to the Company in that they were able, by its use, to meet those sudden demands that came from fogs or snaps of cold. The Company, by its means, satisfied their consumers at a time when gas was wanted most; and they did not lose by dropping the plant when it had done the work required of it. Before sitting down, there was another matter which he could not pass over, and he referred to it with a good deal of pain—that was, the fact that in the district there had been a rather considerable increase in the amount of sickness due to small pox. The Directors had had the question under consideration during the past few weeks; and they had decided to take steps to insist that their workmen and officers who had to visit the houses of consumers should be vaccinated. The Directors had made arrangements for the work to be done, if necessary, at the Company's offices. They had further undertaken that, if any of the men were laid aside temporarily by reason of the vaccination, the amount they would receive from the sick fund should be made up to full wages during the time that the Doctor certified they were absent through this particular cause. Those who were not subscribers to the sick fund would receive half pay. Having regard to the very great number of houses that their men had to go into, the Directors had felt that, not only for the sake of the men themselves, but for that of the consumers generally, it was necessary to do all they could in the way of prevention. As to the sale of the Company's stock that had been going on—he was about to say in driblets, but small portions would be better—he thought they had good reason to be proud that the stock had been sold at about the best price that had been realized by gas stock during the period these sales had been held. In each case, it had been sold to pay investors about 4 per cent. Of course, there had been in contemplation the fact that, having reduced the price of gas, there would probably be an increased dividend in the current half year. But even taking this into consideration, the price received had been a satisfactory one; and the Directors hoped the shareholders would maintain the good reputation they had earned in this way, and see that the next sale, on March 4, was equally as successful as the last.

Mr. JAMES WARREN seconded the motion, which was unanimously carried.

The DEPUTY-CHAIRMAN (Mr. D. Ford Goddard, M.P.) moved the declaration of dividends, less income-tax, at the rates per annum of 5½ per cent. on the "A" consolidated stock and 4 per cent. on the "B" and additional "B" stock. He remarked that he regretted, as all the proprietors did, that the dividend was at the present time ½ per cent. less than they had been accustomed to for many years. They all knew perfectly well the reason for this, as it had been explained by the Chairman. For some time past, they had been in little difficulties owing to the abnormal growth of the business; and they had hitherto had to resort to all sorts of methods to try to tide over the difficulties. But the time had come when they were bound to make a much more considerable enlargement. A new gasholder tank was now completed; a large retort-house would shortly be in progress; and in other ways they were fitting their garments to their growing size.

Mr. HENRY BAILEY seconded the motion.

The CHAIRMAN observed that it must not be taken by the proprietors that the increase in the capital account had been the cause of the reduction in the dividend. This was due solely to the increase in the cost of materials. He was not afraid for his own part—neither was Mr. Goddard, nor were his other colleagues—of the increase in the capital. Future capital expenditure would be made, as it had been made in the past, judiciously under the direction of the Engineer, and under the watchful care of the Directors; and the increase would bring its own share of profit.

The motion was unanimously passed.

Mr. H. D. ELLIS submitted a vote of thanks to the Chairman and Directors, Auditors, and staff-officers of the Company. He referred to the valuable work of the Board in the past, and then said he ventured to think that in the future the Directors would not find their task easier or lighter. The next few years would be a period requiring very great care and attention on the part of those who were responsible for the conduct of gas companies. The Chairman had referred to the approaching competition of the electric light in the district. He (Mr. Ellis) was glad to hear his brave words—that he was not afraid of it, but he was not going to shut his eyes to it. He (Mr. Ellis) believed there was room for both; but they must see to it that the electric light did not get all the room.

Mr. LANG seconded the motion, which was heartily agreed to.

The CHAIRMAN, in responding, spoke kindly of the indefatigable services of Mr. Randall to the Company, and stated in regard to Mr. Broadberry that, having had a fair length of time in which to approve himself in the service of the Company, he (the Chairman) looked forward with confidence to the future of the engineering in his hands.

Both Mr. RANDALL and Mr. BROADBERRY acknowledged the vote—the latter remarking that practically the whole of his life had been spent at Tottenham. He had grown with the works; and the works had grown with him, so that he believed they knew each other as well as works and manager possibly could. He hoped he might have the privilege of continuing his work there for many years.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

Half-Yearly Report and Accounts.

The report to be presented to the shareholders of the Company at the half-yearly meeting next Friday states that there has been an increase of 7·31 per cent. in the quantity of gas sold over the corresponding period of 1900, During the half year, 805 additional accounts have been opened, making the total number of consumers 17,487; while there were on the 31st of December 8880 gas-stoves on hire, being an increase over the 30th of June of 356. The Directors have pleasure in announcing that the lower prices prevailing for raw materials have enabled them to effect a considerable saving in the cost of manufacture; and had not the values of residuals fallen largely, they would have been in a position to carry forward, after payment of the usual dividends, a substantial sum. The profit earned during the half year is sufficient to meet the dividends; and, taking into consideration the present favourable tone of the coal and oil markets, the Directors feel justified in reducing the price of gas by 2d. per 1000 cubic feet from Lady-day next. The rapid growth in the Company's district has rendered it necessary to add to the plant at the works; and at the same time the Directors are introducing machinery with a view to decreasing the cost of manufacture. They have also during the half year laid two large mains at a cost of over £1300, for the purpose of providing for the growing demand for gas in Wallington and the neighbourhood. They therefore find it necessary to raise additional capital; and £10,000 of consolidated "C" ordinary stock will be offered for sale by auction on the 11th prox.

The accounts accompanying the report show that the capital expenditure was increased in the last six months of the year by £6125; bringing up the total to £419,313. As the receipts amount to only £394,031, this account has been overdrawn to the extent of £25,282. The sale of gas for public and private lighting produced a revenue of £57,437; the rental of meters, stoves, and fittings, £4134; residuals, £15,204; and rents, £79—making altogether, £77,164. The expenditure on the manufacture of gas came to £44,143 (coal, oil, &c., costing £31,117); on distribution, to £7337; and on management, to £2574—the total expenses being £59,566. The balance carried to the net revenue account is £17,598; and the sum available for distribution is £16,460. The Directors recommend that dividends be declared for the half year at the rate of 14 per cent. per annum on the consolidated "A" ordinary stock, of 11 per cent. on the "B" stock, of 9 per cent. on the "C" stock, and of 9 per cent. on the "Carshalton capital" ordinary shares, all free of income-tax. The statements relating to the manufacturing operations show that, under the supervision of Mr. J. W. Helps, the Company's Engineer and General Manager, 27,505 tons of coal, 30 tons of cannel, and 383,287 gallons of oil were employed in the production of 438,628,000 cubic feet of gas, of which 390,268,300 cubic feet were sold and 394,942,800 cubic feet accounted for. The estimated quantities of residuals produced were as follows: Coke, 16,521 tons; breeze, 4754 tons; tar, 363,659 gallons; and ammoniacal liquor, 727,621 gallons. The quantity of sulphate of ammonia made in the half year was 281 tons.

MOND GAS OPERATIONS.

In the Mond Gas Act, no less than seven sites for works were scheduled; but after a careful consideration of the merits of each, it was found that the one at Tipton possessed by far the greatest advantages for commencing the Company's operations. The site for the works, in connection with which a contract to purchase has just been entered into, consists of 32 acres at Dudley Port, with an additional acreage of mines, which will ensure lateral support to the buildings to be erected. The site, which is freehold landed and mining property, and is known as the "Burton Estate," is a magnificent one for the purposes for which it has been purchased, having a frontage to the main line of the London and North-Western Railway of about 270 yards, and to Dixon's branch of the Birmingham Canal of about 165 yards; while it is within a few minutes' walk of Dudley Port Station, and ten minutes by water of three railway goods stations. It also adjoins the Tipton Gas-Works. The great merit of the site, however, is its geographical position, being absolutely in the centre of the area over which the Company have parliamentary powers, extending to 123 square miles. Plans are now being prepared for the erection of the works by the Consulting Engineer of the Company, Mr. H. A. Humphrey; and possession of the land will be acquired within the next three weeks. A Press representative was informed by Mr. E. Howl, Managing Director of the Company, that the contract for the work will then be immediately put in hand, and structural operations started without delay, that the total cost of the works and pipe connections will probably amount to £250,000 sterling, and that it is expected that the Company will be in a position to commence the distribution of the gas to industries at the expiration of about two years.

The Halifax Town Council have decided that the plumbers of the town and district shall, within seven days of completing of any work in connection with the water service, give notice to the officials, in order that the work may be inspected and approved.

PROVINCIAL GAS AND WATER COMPANIES.

We continue to-day our usual reports of the meetings of Gas and Water Companies in different parts of the kingdom.

GAS COMPANIES.

Aldershot.

The report which was presented at the recent half-yearly meeting of the Aldershot Gas and Water Company stated that the total revenue for the six months ending Dec. 31 was £21,644, and the expenditure £15,260, which left a surplus of £6384. The Directors recommended dividends at the rate of £11 4s. per cent. per annum on the "A" shares, £8 4s. on the "B" shares, and 7 per cent. on the ordinary "E" shares, all less income-tax. The balance-sheet showed that the expenditure in connection with the manufacture of gas and the pumping of water amounted to £9959; the expenditure at the works, including wages, repairs, &c., to £2652; cost of the distribution of gas and water, including inspectors, and repairs to mains and services, to £663; rents, rates, insurances, &c., to £744; and management expenses to £1238. The total expenditure was thus £15,259. The income derived from the sale of gas amounted to £12,722; rental of meters, to £199; receipts from the sale of residual products, to £4236; sale of sundries, to £139; receipts from the sale of water, to £3907; rental of water-meters, to £42; and sundries, to £395. This made the total receipts £21,644. In moving the adoption of the report, the Chairman (Mr. A. F. Wilson) announced that, as from Jan. 1, the price of gas would be reduced by 2d. per 1000 cubic feet to ordinary consumers. This involved a sum of £550 a year in Aldershot alone; and it carried with it increased dividends to the extent of £90. The dividends the Directors proposed to pay were easily met out of the profits of the half year, and a considerable balance was left; but they must not attach much importance to this, as the Directors could see the necessity for a considerable increase in the expenditure during the forthcoming six months, and they had carried forward part of the profits because they thought they had the future to look to.

Ascot.

The report presented to the Ascot District Gas Company yesterday stated that there was a profit for the past six months of £1624. After providing for every charge against the working, there remained a balance of £2044 at the credit of profit and loss account, out of which the Directors recommended the payment of a dividend at the rate of 5 per cent. per annum; carrying forward a balance of £677. Sales of gas showed an increase of 15½ per cent. over the corresponding period of the previous year.

Barnsley.

In moving the adoption of the report and accounts at the annual meeting of the Barnsley Gas Company on the 17th inst., the Chairman (Mr. E. G. Lancaster) said that though the results of the working might have been better, on the other hand they might have been very much worse. They still felt the effect of the high price of coal—for while they carbonized 200 tons less, they had to pay £411 more for it; and the worst of it was that the value of residuals had fallen. The receipts showed a reduction of £936—£704 less being obtained from the sale of coke—and residuals were still falling; so that they could not look for increased profit from this source. The sale of gas, though reduced by 1¾ million cubic feet, was really very satisfactory, in spite of the increase in the use of electric light. But for the electric light, they would have had to extend the plant; so that, as far as the electric light was concerned, they were inclined to look upon it as friendly instead of hurting them—it had helped them to tide over the difficulty. With regard to street lighting, they did not care how much the electric light was extended, for the gas supplied for the purpose could be sold to their customers. Speaking as ratepayers and townspeople, they were inclined to think the public lighting at Barnsley was not so good as that of neighbouring towns of the same size; and he instanced Rotherham and Doncaster, which he had recently visited. He was very much struck with the brilliance of the incandescent gas lighting there. In both towns the electric light installation and gas-works belonged to the Corporation; and it seemed that an impartial opinion had decided as to which light was the better for street purposes. They would have to face increased rates next year; for, notwithstanding the heavy demands upon them, the rating authorities thought this was a suitable time to raise the burdens of the Company by £500 per year. The authorities had failed to grasp the fact that this increase had really to be paid by the public—it had to come out of the gas consumers' pockets; and if it had not been for this extra burden, they would have been able to increase the discount allowed from 2½ to 5 per cent. off the price charged (3s. 4d. per 1000 cubic feet). The only consolation was that they were going to help the rates by £500 instead of giving the consumers 1d. per 1000 cubic feet off the price of gas—that was what it came to. The report was adopted; and the statutory dividends were declared.

Barnstaple.

The report submitted to the annual meeting of the Barnstaple Gas Company last Saturday week stated that £1176 had been recovered from the late Manager and Secretary (Mr. Richard Ashton), and had been credited to capital account. The balance of profit and loss account, net revenue, amounted to £5521, out of which the Directors recommended the declaration of a dividend of 10 per cent. per annum on the "A" shares and 7 per cent. on the "B" shares, and also the payment of the whole or part of the dividends in arrear on the "A" shares. In moving its adoption, the Chairman (Mr. W. C. Rafarel) said that the twelve months' working compared most favourably with preceding years. The total revenue amounted to £9676, and the expenditure to £7927—leaving a balance of £1749 to be carried to profit and loss account. Out of 41,165,700 cubic feet of gas made (equivalent to 9439 cubic feet per ton of coal carbonized), they had sold 39,276,000 feet (equal to 9000 feet per ton). The number of consumers at the end of the year stood at 1250—an increase of 123; while stoves numbered 361, or nearly half as many again as were let last year. The difference between the amount recovered from Mr. Ashton and the amount credited to capital account was explained by the payment of unpaid dividends and the costs of recovery. The price of gas was claiming the serious consideration of the Directors; and if the coal contracts made in May turned out as well as was hoped, there would be a reduction as from the July quarter. The payment of the arrears of dividend on the "A" shares would absorb £588, and still leave £3351 to be carried forward. Dr. Harper seconded the proposal, and thought that after the introduction of the electric light as much gas would be required as at present. Mr. Ashton said he was very sorry that such a paragraph in the report as that referring to himself was found necessary; and he also regretted that a mistake was made by himself which was never discovered by the Directors or Auditors. It was absolutely a mistake. He had no idea such a thing existed until the matter was brought to his notice by the present Secretary. He immediately saw Mr. Ffinch, the Company's Solicitor, and when shown the books by him, at once said: "There is an error, and I must be responsible for it." He never attempted to hide anything. The books were open to both the Auditors and the Directors. The mistake was not discovered until an application was made to him for dividends due to Mr. Marshall. The dividend warrants had been drawn; but he did not know the address of the shareholder, and they were kept. A demand was made upon him for this money. He told Mr. Ffinch he did not owe any money; that he had never received the dividend warrants; and that if they examined the books, they would find the cheques had never passed through the bank. It appeared that this mistake of between £600 and £700 was swollen into nearly £1200; and a demand for the amount was made upon him. Rather than have the disgrace attach to him that he was a rogue, he submitted to the extortion. After a long (and not very edifying) discussion, the report was adopted. At a subsequent extraordinary meeting, the Directors were authorized to borrow on mortgage or debentures £3000, under the powers of the Barnstable Gas Order, 1895. It was explained that at present they only proposed to raise £458—the amount standing to the debit of capital account.

Bedford.

At the half-yearly meeting of the Bedford Gas Company last Wednesday—the Rev. Paul W. Wyatt presiding—the statutory dividends were declared. In moving the adoption of the report, the Chairman said that the continued high price of gas coal alone stood in the way of further reductions in the charge for gas. They were now waiting anxiously for the July contracts, on which the whole matter turned. Coke and residuals were at very low quotations; but the general business outlook was excellent. The present rate of increase was nearly three times that of a few years ago. By improvements, completed and in hand, they were anticipating future demands. Further capital would be needed next autumn; and then, practically speaking, the capital account of the Company would be closed, and this at a figure comparing very favourably with other enterprises. The Deputy-Chairman (Mr. J. Miller) spoke of the works in progress, and said that slot meters and gas-fires steadily grew in favour; while the consumers numbered 3584, out of a population of 35,144. It was stated that, at the request of the Corporation, an experiment was being made in street lighting on the Kern system. It was for the Corporation to decide as to the capital expenditure on the conversion of the lamps. There had been highly favourable comments on the experiment. The Company had no interest in the matter, beyond desiring the best possible light for the public. There was no profit to be made on street lighting on such a low basis as they were accustomed to in Bedford.

Brighton and Hove.

At the half-yearly general meeting of the Brighton and Hove Gas Company on the 7th prox., the Directors will report an increase of 1·94 per cent. in the quantity of gas sold in the six months ending Dec. 31. The total sale for public and private lighting was 535,617,800 cubic feet, which produced a revenue of £81,782. The sale of residuals yielded £15,488; the rental of meters, stoves, and fittings, £6172; and the total receipts were £103,685. The expenditure for coal, coke, and oil used in the manufacture of gas was £42,541—a decrease of £11,081; but this was exceeded by the amount of the reduction in the rental consequent upon the lowering of the selling price of gas, the falling off in the value of residuals, and the increase in the revenue charges. The special expenditure commenced the previous half year, and referred to in the last report (including the sea defences at Portslade), was completed in the past half year. The effect of this outlay has been to add to the stability and efficiency of the Company's works and plant to a very important extent. The expenses connected with manufacture in the half year amounted to £64,601; with distribution to £12,660; with the management of the undertaking to £4230—the total outlay being £86,443. The balance carried to the profit and loss account is £17,242; and the sum available for distribution is £14,580. The Directors recommend the declaration of dividends at the rate of 10, 7, 6, and 4 per cent. per annum on the four classes of stock. The payment of these will require £21,321; and therefore it will be necessary to take £6741 from the reserve fund. The balance to the credit of this fund which will then be carried forward will be £60,521. With regard to working, under the supervision of the Company's Engineer (Mr. Joseph Cash, M.Inst.C.E.), 37,605 tons of coal and 477,342 gallons of enriching oils were used; the estimated quantities of residual products being: Coke, 20,206 tons; breeze, 2041 tons; tar, 336,794 gallons; and ammoniacal liquor, 846,861 gallons.

Colchester.

The Directors of the Colchester Gas Company, in the report which they presented at the half-yearly meeting last Friday, stated that the accounts for the six months ending Dec. 31 showed a balance at the credit of revenue account of £2256. A very satisfactory increase had taken place in the quantity of gas made, which amounted to 5·26 per cent. more than in the corresponding period of the previous year. The price had been further reduced by 3d. per 1000 cubic feet during the six months. The receipts amounted to £12,480; while the expenditure included £5877 for coal, £1088 for wages, £665 for rates and taxes, and £1288 for repairs and maintenance. The report and balance-sheet were adopted; and dividends of 10 per cent. on the old shares and 7 per cent. on the new shares were declared.

Ipswich.

In moving the adoption of the report and accounts—which were noticed in last week's "JOURNAL"—at the annual meeting of the Ipswich Gas Company on the 17th inst., the Chairman (Mr. D. Ford Goddard, M.P.) said he thought that everyone who had looked at the balance-sheet would agree that it was a very satisfactory one. Almost every item showed some kind of growth. In the first place, the capital account had been increased by £2000 of share capital, £2700 of mortgage bonds, and £2257 of premium capital. This, and more than this, was an outlay required by the natural growth of the undertaking. The expenditure on capital account showed an amount of £1221 for land. This was due to their fitting-up business. The work of looking after fittings, and trying to maintain in the houses of consumers a satisfactory condition of gas supply, necessitated the employment of a constantly-growing number of workmen and inspectors. The premises at the office became too small for their accommodation; and the Directors had consequently been obliged to extend those premises. Then there was an amount of £3390 for new buildings and apparatus. For the most part, this money had been spent in putting up new coal-conveyors. One of the exigencies of present-day business in which coal was used, was that, in order to get the lowest freights, the steamers bringing cargoes must be discharged as quickly as possible; and, in order to do this, it was necessary to have proper machinery. They had had hydraulic cranes for some years; but they had become too small, and they had been obliged to put up larger ones. In addition to this, the coal was discharged on conveyors, which carried it right away from the cranes into the stores, and deposited it there without any intermediate manual labour at all. The requisite provision for this purpose was rather expensive; but the cost of coal per ton was thereby considerably reduced. It also gave them a far better position in dealing with the difficult problem of labour. With all these expenses, however, they had not yet got to the end of their requirements in the way of capital. More would be wanted for the retort-house extension and for their station-meter; and the Directors would therefore ask the shareholders for permission to raise the balance of the capital left to them as occasion required. Before very long, it would be necessary for the Company to go to Parliament for power to raise further capital. It was in 1883 when they obtained their last Act; and certainly no more than one or two years could elapse before they asked for further powers. The Directors were not at all unmindful of the advantage of keeping the capital account as low as was compatible with good working and results; and the capital they employed compared exceedingly favourably with any London and Suburban London Companies, and with Provincial Companies also, taking it at per 1000 cubic feet of gas sold. Thanks to the admirable management of Mr. J. T. Jolliffe, and the watchfulness of the whole staff, they had been enabled to tide over the period of stress, due to the high price of coal, without increasing the charge for gas. Had it not been for the higher price of coal, they would have been able to reduce the charge for gas a year or two ago. However, they saw their way, as from July 1 next, to reduce the price from 2s. 10d. to 2s. 8d. per 1000 cubic feet; and this, he thought, would compare most favourably with the figures of any other local company. Last year they sold 22½ million cubic feet of gas more than the previous year—or an increase of 7⅞ per cent. In the matter of residuals, they had done very well, excepting with tar; and they had been able to get back 62 per cent. of the cost of the coal, or 11s. 5d. for every ton. The balance carried to the profit and loss account was £10,635—not quite enough to pay the dividends; but considering they carried forward last year a large balance of over £7000, there was no difficulty in making up the small difference. The report was adopted; and dividends at the rates of 12 per cent. per annum on the "A" stock, 9½ per cent. on the "B" stock, and 9 per cent. on the "C" stock were declared. Permission was afterwards given to the Directors to raise £20,172 by the creation and issue of new ordinary stock.

Portsmouth.

The half-yearly ordinary general meeting of the Portsea Island Gas Company took place last Saturday, under the presidency of the Chairman (Alderman Sir John Baker, J.P.). The revenue account for the six months ended Dec. 31 showed the receipts to have been £81,325, of which the expenditure allowed £13,695 to be carried to the profit and loss account, making the latter £38,025, which was applicable for dividends. It was recommended that these should be at the full rate—13 per cent. on the "A" and "B" shares, 12 per cent. on the "C" shares, 10 per cent. on the "D" shares, and 5 per cent. on the Company's stock, less income-tax. The balance to be carried forward amounted to £25,332. During the half year, 45,607 tons of coal were carbonized, as against 46,086 tons in the corresponding period of the previous year; but for fuel and other purposes 224,516 gallons of oil had been used, as compared with 41,509 gallons. The quantity of gas made had amounted to 526,972,000 cubic feet, as against 488,352,000 cubic feet in the corresponding half of 1900; the quantity sold was 491,770,500 cubic feet, as against 438,707,800 cubic feet; and the quantity not accounted for was 29,435,000 cubic feet, as against 44,690,100 cubic feet. The reserve fund now stands at £46,008; in the extraordinary renewals account there is a balance of £2926; and to the credit of the insurance fund account there was a sum of £9620. In moving the adoption of the report, the Chairman said they had to congratulate themselves that financially the Company had again been very successful, and that they had been devoid of public or private complaint with regard to the supply. The incandescent lighting in certain streets had practically been in competition with the electric light; and they found that their system was preferred, and had given more satisfaction than electricity. They were extending the hiring of stoves to an almost alarming extent, which was not only a financial benefit to the Company, but was a means of giving greater comfort to the consumers. They could not see that there was any possibility of the demand for gas becoming less. The output had increased 7·73 per cent. The rental of slot meters had increased 14·32 per cent. The number of gas-stoves now on hire was 15,000, and of slot meters 8000. The automatic meters had last year produced £20,127, as against £9383 in the previous year—an increase of 114 per cent.; and for cookers the sum of £1257 had been received. The new works were being proceeded with steadily, under the excellent management of Mr. J. D. Ashworth, their Engineer; and he believed they would have there an ample supply of water, which would be the means of saving some £600 or £800 a year. The report was adopted.

Leighton Buzzard.

The annual meeting of the Leighton Buzzard Gas Company was held on the 17th inst., under the presidency of Mr. Robert Richmond. The report of the Directors stated that the revenue account showed a profit for the year ending Dec. 31 of £1490. This amount, with £495 brought forward from last year's accounts, made a balance of £1985 standing to the credit of profit and loss account. Out of this sum, the Directors recommended the payment of dividends at the rate of 9 per cent. per annum on the original stock and £6 6s. per cent. on the new ordinary stock, free of income-tax. This would absorb £1452, and leave £533 to be carried to the next accounts. The Chairman said the balance-sheet was a very good one; and the first result of it had been, as they knew, to enable them to reduce the price of gas 1d. per 1000 cubic feet on Jan. 1, making a reduction of 3d. since last October. This was very satisfactory, not only from the Company's point of view, but from that of consumers. Their price now compared very favourably with the small towns around them. As far as he could see, there would be no reason to raise the price of gas during the coming year, because it was not expected that coal would go up. On the contrary, they hoped it would be easier, unless something unforseen happened. There had been a fair increase of business during the year. Some might think the extension to Ascott accounted for the increased sale; but as this extension had only been completed a short time, it would make little difference to their output. He was pleased to say they were able to recommend an extra 1 per cent. dividend on the original stock, and a similar increase on the ordinary stock. They could not have had this satisfactory balance-sheet without good management of their works; and he was sure they would all agree with him in thanking Mr. C. F. Ruggles and the staff for the efficient way in which they had carried on the work. Mr. Ruggles' duties had been specially heavy. The report was adopted.

Normanton.

The half-yearly meeting of the Normanton Gas Company was held on the 15th inst.—Mr. Edwin Mitchell, J.P., in the chair. The Directors in their report stated that the profits for the six months ending Dec. 31 amounted to £1095; and the sum available for distribution, after providing interest on mortgages, was £2574. In proposing the adoption of the report and accounts, the Chairman said the Company continued to make steady progress. The revenue account showed an income of £4296, and an expenditure of £3200. There had been a reduction of £172 in the price of coal; but, in consequence of the depressed condition of the market for residuals, there was a decrease in the income from this source of £335. The net falling off in the income was £221 13s. 4d. The report was adopted, and dividends of 5½ per cent. on the original stock and 4 per cent. on the additional stock were declared.

North Middlesex.

The Directors of the North Middlesex Gas Company, in the report which they will present to the shareholders at the half-yearly meeting to-morrow, state that in the six months ended Dec. 31 there was a considerable increase in the Company's business. The sale of gas exceeded that for the corresponding period of the previous year by 9,370,300 cubic feet, or 20·45 per cent. To enable this large increase in demand to be met, extensions of manufacturing plant and mains have been carried out during the six months. A further sum of £250 has been transferred from the profit and loss account to the credit of the insurance fund. From the balance of profit available for division (£4719), the Directors recommend that dividends for the half-year be declared at the standard rates. For the payment of these, £2453 is required, which leaves a balance of £2266 to the credit of profit and loss account to be carried forward. The receipts for gas totalled £11,037, rental of meters, fittings, and stoves brought in £576, residual products realized £1869, and transfer fees amounted to £2. On the other side of the revenue account, manufacture of gas (including coal, oil, coke, &c., with dues, carriage, unloading, and all expenses of depositing same on works, £4621) cost £6789, distribution £1751, rates and taxes £573, management £749, and sundries £81. The expenditure was thus £9,944; and the revenue amounted to £13,484. The amount of gas made was 55,180,200 cubic feet; while 4522 tons of common coal, 15 tons of cannel, and 36,602 gallons of oil were used.

Reading.

The report to be presented at the half-yearly meeting of the Reading Gas Company to-day states that the gradual increase in the business of the Company, has necessitated a corresponding increase in the plant required for manufacture; and the exhaustion of the powers of the Company to raise capital thus brought about, together with the prospect of further extensions which will be required to keep pace with the increase of consumption, makes it necessary for an application to be made to Parliament in the present session, to enable the Company to raise additional capital, and for other purposes. When the cost of coal was so largely increased upwards of a year ago, the Directors only made an advance of 2d. per 1000 cubic feet in the price of gas. During the last six months, coal has been somewhat reduced in cost; but the value of residuals—especially coke and tar—has so seriously diminished, that it has resulted in a very large loss of revenue from such sources during the past half year. Notwithstanding this, having regard to the satisfactory financial result of the previous midsummer half year, and to the balance of profit then shown, the Directors recommend that full dividends for the six months to Dec. 31 be paid upon all the stocks and shares of the Company. The erection of the new gasholder has been completed; and the show-rooms which have been recently provided at the King's Road works have been visited already by many persons. For the convenience of consumers, and in order to ensure the full advantages of the Welsbach incandescent light, the Directors have decided to undertake the upkeep of these burners for a small quarterly payment; and they have also determined to let gas fires out on hire. In order to meet the demand so constantly made for prepayment

meters, the Board have decided to provide the necessary installation, and to supply the fittings, pendant, burners, and cooking-stoves upon terms and conditions advantageous to consumers. From the revenue account, it appears that £28,318 was realized from sales of gas, £8973 from residual products, and £54 from rental of stoves. Manufacture (including coals, £19,558) cost £26,688, distribution £2899, lighting of public lamps £527, rates and taxes £1182, rents £109, management £1783, and bad debts and law charges £145. A sum of £500 has been placed to the credit of the contingency fund. The total expenses were £33,833; while the receipts amounted to £37,345. The quantity of gas sold was as follows: Private consumers, 172,443,400 cubic feet inside the borough and 7,589,600 cubic feet outside. Public lighting and other contracts (estimated) 11,546,242 cubic feet. The weight of mixed gas coal carbonized by the Engineer (Mr. Herbert E. S. Baker) was 18,069 tons.

Wakefield.

The half-yearly meeting of the Wakefield Gas Company was held at the offices on Monday last week—Dr. Statter, the Chairman, presiding. The accounts presented showed that the sale of gas in the six months ending Dec. 31 produced a revenue of £16,212; residuals brought in £4692; and the total receipts were £21,899. The expenditure being £17,131, there was a balance of £4768 to go to the profit and loss account. The amount available for distribution was £6836. The Chairman, when moving the report, remarked that, although there had been an increase in the sale of gas of more than 5½ per cent., he could not say, as he did in the past half year, that the usual dividends had been earned. This was a matter for regret. The factors in the deficiency were the high price of coal and the fall in the price of tar; but the main reason was the "arsenic in beer scare," which had at one blow deprived the Company of their sale of coke for malting purposes, which had hitherto been their chief market. Turning to the balance-sheet, there had been spent a total of £17,131, which was £472 less than in the corresponding half year; the gross income being £21,899, or a reduction of £758. There had been a falling off of £308 in the amount received from tar, and of £1441 from coke—two very serious items which showed how completely the coke market had collapsed. During the half year, the Directors had adopted the principle of maintaining consumers' Welsbach mantles and fittings at a charge of 4d. per burner per month. In London and Sheffield, this had been done for some time; and though it barely paid expenses, it was satisfactory in the long run by making incandescent gas lighting popular. They had only recently commenced this practice, but, so far, 37 consumers had availed themselves of the privilege; and the number of burners being attended to was 135. Flat flame burners were still being issued free; while boiling-rings were very popular. Arrangements had also been made to let on hire a special gas-cooker at 1d. per week, or 1s. per quarter. Benzol plant for enriching the gas, and at the same time doing away with accumulations of naphthalene in the service-pipes, had proved most effective; practically the whole of the Company's district being now free from this trouble. Mr. Goldthorp seconded the motion; and it was carried. The thanks of the meeting having been given to the Chairman for presiding, and to the Directors for their attention to the business of the Company, Dr. Statter, in responding, proposed that a similar compliment should be paid to the Engineer and Manager (Mr. H. Townsend), to the Secretary (Mr. W. H. Parker), and to their respective staffs.

WATER COMPANIES.

Exmouth.

At the half-yearly meeting of the Exmouth Water Company last Tuesday, the Directors reported that the award in the arbitration between the Company and the District Council had been made (*ante*, p. 105). The amount of purchase-money was £67,533, in addition to £7000 secured by the debentures, which debt would be taken over by the Council. The Directors were glad to be able to congratulate the shareholders on the result of the arbitration. The date fixed for payment was March 24; but some little time would be occupied after this in winding up the Company's affairs. A sum of £1152 was now available for division; and the Directors recommended that a dividend at the maximum rate be paid for the half year. The Chairman (Rev. C. R. Carr) said that when the works were taken over by the District Council, the ratepayers would have a water undertaking which, having regard to its size, was second to none in the United Kingdom. As to the result of the arbitration, he thought that if anyone had cause for dissatisfaction it was not the Company. It was true that for the past two years they had been able to pay their maximum dividend; but the time was close at hand when a considerable amount of new expenditure would be needed to meet the growing requirements of the town. This capital would not be remunerative for some years; and there would consequently have been a reduction of dividend. On the other hand, the town was getting a first-class undertaking. He regretted that some members of the Council had approached the business in a hostile spirit, and thereby increased the cost. It should be remembered that the Company had been largely instrumental in adding to the popularity of Exmouth by the good supply of water they had maintained. The dividend recommended was declared.

Leatherhead and District.

The report submitted by the Directors of the Leatherhead and District Water Company, at the half-yearly meeting on Thursday last stated that the receipts for the six months ending Dec. 31, amounted to £2992, and the working expenses to £1752—leaving a profit of £1240. To this had to be added £872, the sum brought from the previous half year, making a total of £2112. Deducting from this £161 for interest due on debenture stock, there remained £1951 available for division. The Directors recommended a dividend at the rate of 5½ per cent. per annum, which would absorb £971, and leave a balance of £980 to be carried forward. The Engineer (Mr. F. S. Cripps) stated that the supply during the period under review had been satisfactory, both as regarded quantity and quality, and that more than 2000 yards of new mains had been laid. The Chairman (Mr. John Boustead, J.P.), in moving the adoption of the report and accounts, said that happily the course of the Company was so satisfactory, and in a way so uneventful, that there was very little, except continued progress, for him to draw attention to. They had distributed 7 million gallons of water more than in the corresponding period of the previous year, and this had been accomplished without any increase of expenditure; so that whatever this amount of water represented was extra profit to the Company. Water-rates realized £258 more; and it was a very encouraging fact that this had been secured without any rise in the cost. Rates and taxes amounted to £74 more, owing partly to a reassessment of the undertaking, and partly to the expense incurred by the district in carrying out the drainage scheme. During the six months 39 new services had been connected; and with the Chessington supply (which was estimated to yield £50 per annum), this would mean an additional revenue of £210 a year. Owing to the larger profit made, the Directors could have recommended a higher dividend; but they had a great desire to build up an emergency fund, which would place them beyond the reach of such troubles as must arise from time to time with a business like theirs. The cost of distribution was less than in the previous year; bad debts were practically the same; while depreciation had been increased to the extent of £35. Wages at the works were nearly the same; and fuel had cost a little less. The Chessington development was going on satisfactorily; and if building operations extended in that direction, of course the Company would derive still further advantage. The last quarterly analysis of the water showed that there was no evidence of pollution from dangerous sources. A shareholder asked if the Company could not join in an inter-communication scheme with some other water companies, to which the Chairman replied that there was only one Company (the Lambeth) with whom they had an opportunity of doing anything of the sort. But perhaps in case of emergency they might be able to supply Epsom too; and indeed they had just entered into an agreement to furnish water to an outlying portion of the Epsom rural district. The report having been adopted, the dividends recommended were declared.

Maidstone.

The report submitted at the meeting of the Maidstone Water-Works Company stated that, for the six months ending Dec. 31, the water-rents amounted to £6430; being an increase of £534 as compared with the corresponding period of last year. The accounts showed the sum of £5018 to the credit of profit and loss account. The Directors recommended the payment of a dividend for the half year, free of income-tax, at the rate of £7 3s. 4d. per cent. per annum on the 10 per cent. shares and at the rate of 5 per cent. on the 7 per cent. shares. These payments would absorb the sum of £1603, leaving £3415 to be carried forward.

Sunderland and South Shields.

According to the accounts presented at the annual general meeting of the Sunderland and South Shields Water Company last Thursday, the revenue for the past year amounted to £91,985, and the expenditure to £48,953; leaving £43,032 to go to the profit and loss account, the balance on which was £38,201. The Directors, in their report, recommended that a dividend for the six months ending Dec. 31 of £4 10s. per cent. on the ordinary and preference stocks, of £3 3s. per cent. on the additional stock, and of £2 5s. per cent. on the new stock of the Company, should be declared; making, with the interim dividend paid in September last, £9, £6 6s., and £4 10s. per cent. on the respective stocks for the year (free of income-tax.) The Directors expressed their pleasure in adding that in all their districts they were able, during the drought of last autumn, to afford a full and constant supply of water. The report was adopted, and the dividends declared.

PUSHING BUSINESS AT THE ANTIPODES.

Evidence is constantly reaching us from all quarters that the present-day gas-works manager must add to his technical qualifications for the position the skill of the successful advertising agent, if he wishes the concern with which he is associated to make headway. Mr. William Arnott, the Manager at the Cape of the South African Lighting Association, has forwarded to us from time to time examples of his aptitude in keeping the advantages of gas as an illuminant and a culinary agent well before the public; and we have just received from Mr. W. G. Quicke, the new Engineer of the Perth (Western Australia) Gas Company, a striking proof that he, no less than a certain well-known firm in the Metropolis of the Mother Country, is on the alert to make a public event the vehicle for the conveyance of some home-truths about gas. For example, on the occasion of the recent general elections, Mr. G. Leakes was returned to office as Premier—the Democratic party having won their seats again, and Mr. A. E. Morgans being defeated. The following day, Mr. Quicke secured the insertion in the "Morning Herald" of a very cleverly executed sketch of Mr. Leakes, in the attire of a *chef*, standing complacently by a large gas-cooker, with his thumbs in the armholes of his waistcoat, watching the retreating Mr. Morgans. The culinary utensils and the joint and pastry are appropriately labelled for the occasion—the joint being "Democracy." The steam ascending from one of the vessels bears the incontrovertible statement that "Gas is Power," while in the lines above the sketch the public are informed that the Gas Company supply it at 5s. 10d. per 1000 cubic feet net. That they are able to do so is attributable to the results of the first six months' administration of Mr. Quicke, which justified the Directors in lowering the charge from 6s. 8d. to the above-named figure from the commencement of the present year. As an advertisement, the sketch was highly successful. We may add that the cooker shown was not a fancy one, but one which has actually been put in by the Company at a refreshment establishment in the city, where it is giving great satisfaction. By advertisement and by the display at the Company's show-room, the inhabitants of Perth are being kept well informed of the many advantages of gas in the household.

The shareholders of the Eccleshill and Bolton Gas Company have unanimously approved the Bill being promoted by the Bradford Corporation for power to purchase the undertaking of the Company.

THE NEW INCLINED RETORTS AT LEEDS.

The inclined retort system will come into operation at the York Street gas-works of the Leeds Corporation during the present month. About £21,000 has been spent on the installation. The building has been designed with the object of affording the men engaged in charging and drawing the retorts the maximum amount of comfort. The plant consists of one bench containing 96 retorts, in twelve settings of eight each, heated by regenerative furnaces. The stage from which the whole of the retorts will be charged automatically runs the entire length of the buildings. There are two coal and cannel breakers of the revolving type; each capable of crushing 25 tons per hour. Mr. R. H. Townsley, the General Manager of the Gas Department, has supervised the carrying out of the various contracts. Messrs. George Oakes and Sons, of Leeds, erected the building and chimney; and Messrs. Graham, Morton and Co., of Leeds, were the Contractors for the inclined retort plant. The coal breakers, elevators, and conveyors will be worked by a high-pressure engine, supplied by Messrs. Ruston, Proctor, and Co., of Lincoln.

BALLYMENA GAS SUPPLY.

The Urban District Council and the Gas-Works.

On Monday last week, the Chief Engineering Inspector of the Local Government Board for Ireland (Mr. P. C. Cowan, M.Inst.C.E.) attended at the Ballymena Town Hall, and held an inquiry relative to an application made to the Board by the Urban District Council for a Provisional Order under the Gas and Water Works Facilities Act Amendment Act, 1873, and the Public Health (Ireland) Act, 1878. Messrs. Alexander Caruth and Son, Solicitors, appeared on behalf of the Council; and no opposition was offered to the application. The financial position of the Council was explained at some length by Mr. Caruth, who pointed out that the applicants were anxious to obtain the control of the lighting of the town and the supplying of the inhabitants with gas in the interests of the ratepayers. With this object in view, they had some months previously negotiated with the Ballymena and Harryville Gaslight Company, asking that the latter should sell their works; but the Company then declined the proposal. The Council had recently met and passed a resolution to the effect that they were prepared to buy the works on the basis of their present market value, to be decided by two experts—one to be chosen by each party—that they should select an umpire, and that the decision of any two should be binding. Replying to this, Mr. J. K. Currie, representing the Company as their Solicitor, wrote that the Directors were agreeable to sell on the terms mentioned. Mr. Caruth said as far as this went, the Directors thought it would be necessary for them to obtain the consent of the shareholders before they could finally say that the arbitration was agreed on; but he had been assured that there would be no difficulty on this score. Mr. H. O'Hara, the Town Clerk and Surveyor, gave evidence as to the valuation of the town, the rates assessed, and other necessary information of a like nature, dealing with statistics generally, and pointed out that the Provisional Order should include the acquiring of additional ground in Harryville for new gas-works or storage purposes as might be required. The area of the land scheduled in the draft of the Provisional Order was about 2 acres. It was situate in a convenient and suitable position, adjoining the Ballymena and Larne Railway, which would be one of the boundaries of the new premises. The land had been obtained on a lease, in perpetuity, at the moderate rent of £4 per acre per annum. The Inspector remarked that this was a mere trifle for a place like Ballymena; and the offer was certainly a very generous one on the part of the landlord. Mr. Caruth said this gentleman (Mr. G. T. Graham) was the ex-Chairman of the Council. The Inspector said it made matters more satisfactory, and much easier to deal with. He added that he would visit the gas-works, and report to the Local Government Board as early as possible on the statements adduced.

GAS MANUFACTURE IN THE UNITED STATES.

In the number of the "Progressive Age" for the 1st inst., Mr. Arthur L. Hunt gives the following extracts from the Twelfth Census Returns of the United States. The statistics presented embrace the operations of establishments engaged in the manufacture of gas for sale, including the plants owned and worked by municipalities, but not those privately owned, the gas made at which is not sold.

Table I. shows the remarkable growth which has taken place in the gas industry during the past half century. The first census at which the statistics of gas manufacture were returned, with sufficient accuracy and detail to justify a comparison, was that of 1850. In that year, 30 establishments were reported, as compared with 877 in 1900—an increase of 847, or nearly thirty-fold. During the same period, the capital increased from $6,674,000 to $567,000,506, or over eighty-fold; the number of wage-earners, from 952 to 22,459, or twenty-fold; the total wages, from $390,684 to $12,436,296, or thirty-fold; the cost of materials, from $503,074 to $20,605,356, or nearly forty-fold; and the value of products, from $1,921,746 to $75,716,693, or nearly forty-fold.

The industry was not reported at the tenth census, and consequently no figures are available for the production of gas in 1880. During the decade from 1890 to 1900, the number of establishments increased from 742 to 877, or 18·2 per cent. This increase is more apparent than real, as the full number of establishments was not reported in 1890. The indications are that the number of establishments engaged in the industry is not increasing to any considerable extent. This is made clearer when it is stated that while there were 66 new establishments constructed during the past decade, 92 establishments from which reports were received in 1890 failed to make returns in 1900. Of this latter number, 47, or over one-half, were not in operation, having been dismantled, closed indefinitely, or changed to electric plants. Of the 45 establishments remaining, nearly one-third now distribute natural gas; a few failed to make returns for census purposes; and 18 which were reported separately in 1890 have since lost their identity through consolidation.

The number of new establishments seems small when it is considered that of the 1653 cities and towns in the United States having a population of 2500 and over in 1890, there were only 530 not enjoying gas privileges. Of the 877 establishments shown for the twelfth census, 269, or 30·7 per cent., were operated in connection with the generation of electricity; and it was reported in many cases that the production of gas was attended with an actual loss.

The striking increase in capital—119·1 per cent.—is found chiefly in the items of machinery, tools, implements, and equipment. It is due to the constant demand for new equipment required to provide for increasing service. This also explains, in part, the fact that the percentage of increase in the value of the products—32·9—is so much smaller than the percentage of increase in capital; another factor being the reduction in the price of gas during the past decade, which would reduce the percentage of increase in the value of products. Between 1890 and 1900, the quantity of gas sold by gas companies increased 83·7 per cent., which may be a more accurate indication of the increase in the production than that represented by 32·9 per cent., the increase in value. This is further illustrated by comparing the average capital and product per establishment in 1890 with those items in 1900. In 1890, the average capital per establishment was $348,749, and in 1900, $648,523, or an increase of 86 per cent. in the average capital per establishment. The average value of products per establishment in 1890 was $76,802, while in 1900 it was $86,336, or an increase in value of products per establishment of only 12·4 per cent.

There are 827 cities and towns represented by the 877 establishments from which returns were received. The number of companies, and the populations supplied, are shown in the following table :—

Population.	No. of Companies.
Less than 5,000	200
5,000 to 10,000	260
10,000 ,, 20,000	177
20,000 ,, 25,000	47
25,000 ,, 50,000	81
50,000 ,, 100,000	44
100,000 ,, 200,000	20
Over 200,000	48

The most noteworthy feature indicated by the above figures is the fact that 460, or 52·5 per cent., of the 877 gas plants from which reports were received, are in cities and towns of less than 10,000 inhabitants. This is more than fifteen times the total number of establishments in the United States in 1850. Further, of the 460 plants located in cities and towns of less than 10,000 inhabitants, 200, or 22·8 per cent. of the entire number reported, are in localities of less than 5000 inhabitants; showing that in matters of illumination a goodly number of the smaller towns enjoy the same privileges as the larger cities.

In eight States there has been a decrease in the number of establishments. This is caused, as already noted, by the number of establishments reporting in 1890 that in 1900 were either abandoned or had lost

TABLE I.—*Comparative Summary, 1850 to 1900, with Percentage of Increase for each Decade.*

	Date of Census.					Percentage Increase.		
	1900.*	1890.†	1870.	1860.	1850.	1890 to 1900.	1860 to 1870.	1850 to 1860
Number of establishments	877	742	390	221	30	18·2	76·5	636·7
Capital	$567,000,506	$258,771,795	$71,773,694	$28,848,726	$6,674,000	119·1	148·8	332·3
Salaried officials, clerks, &c.	5,904	‡1,864	§	§	§	216·7	..	..
Salaries	$5,273,500	‡$2,143,169	§	§	§	146·1	..	..
Wage earners, average number	22,459	12,996	8,723	5,730	952	72·8	52·2	501·9
Total wages	$12,436,296	$8,449,625	$6,546,734	$2,321,536	$390,684	46·3	182·0	494·2
Men, 16 years and over	22,446	12,952	8,705	5,730	950	73·3	51·9	503·2
Wages	$12,431,234	$8,492,797	§	$2,321,536	§	46·4	..	..
Women, 16 years and over	10	..	..	..	2	..	..	‖100·0
Wages	$4,256	..	..	..	§	..	..	..
Children, under 16	3	44	18	..	..	‖93·2	..	..
Wages	$806	$6,828	§	..	..	‖88·2	..	..
Miscellaneous expenses	$14,769,022	$7,799,385	†	†	†	89·4	..	..
Cost of materials used	$20,605,356	$14,037,087	$10,869,373	$3,667,630	$503,074	46·8	196·4	629·0
Value of products	$75,716,693	$56,987,290	$32,048,851	$12,016,353	$1,921,746	32·9	166·7	525·3

* Includes 15 establishments operated by municipalities.

† Year 1880 not reported. ‡ Includes proprietors and firm members, with their salaries; number only reported in 1900. § Not reported separately. ‖ Decrease.

TABLE II.—*Capital of Gas Companies in* 1890 *and* 1900.

	1900.		1890.		Percentage Increase.
	Amount.	Per Cent. of Total.	Amount.	Per Cent. of Total.	
Land	$50,050,371	8·8	$45,521,707	17·6	9·9
Buildings	58,486,472	10·3	35,048,435	13·5	66·9
Machinery, tools, and implements	376,790,335	66·5	153,830,910	59·5	144·9
Live assets, total	81,673,328	14·4	24,370,743	9·4	235·1
Total	$567,000,506	100·0	$258,771,795	100·0	119·1
The total live assets are made up as follows:—					
Raw materials in hand			2,654,254	1·0	
Stock in process of manufacture, finished products in hand, including bye-products	6,838,208	1·2	1,914,136	0·7	49·7
Cash, surplus, reserve fund, bills and accounts receivable, and all sundries not elsewhere reported	74,835,120	13·2	19,802,353	7·7	227·9

their identity through consolidation. The greatest number of establishments reported was in Illinois, which showed an increase of 17, followed by Pennsylvania with 16 additional plants. Of the 66 establishments which commenced operations during the decade, 12 were located in Illinois, 6 in New York, and 5 each in Michigan and Ohio. In Arkansas, California, and Illinois, new plants were constructed during the census year.

While, in the majority of cases, separate book accounts were not kept for the 269 establishments engaged in the production and distribution of gas in connection with electric light and power, an equitable division of the capital was made by the officials furnishing the information; so that the data may be accepted as fairly representing the capital engaged in the manufacture of gas.

The value of machinery, tools, and implements, including gas-making apparatus and machinery, gasholders, mains and consumers' services, teams, tools, horses, waggons, and other accessories, constituted the principal item reported for capital in both years. In 1900, this item amounted to 66·5 per cent. of the total capital, having increased 144·9 per cent. since 1890. For the same period, the value of land increased 9·9 per cent., and the value of buildings 66·9 per cent. But land and buildings, while showing an absolute increase, now constitute a relatively smaller proportion of the total capital than they did in 1890. The land decreased from 17·6 to 8·8 per cent., and the buildings from 13·5 to 10·3 per cent., of all capital reported. A slight difference exists in the manner of reporting the live assets at the two censuses under comparison. In 1890, the raw materials were separated from stock in process of manufacture and finished products; but in 1900, these items were combined. See Table II.

It will be seen that live assets, including raw materials, stock in process of manufacture, and finished products in hand, together with cash, surplus, reserve fund, bills, and accounts receivable and all other sundries, show an increase of 235·1 per cent. The large increase over 1890 in the items of cash, surplus, &c., is partly due to the accumulation of profits held as a reserve fund. These figures do not represent the capital stock of the establishments engaged in the manufacture of gas; but they stand for the actual value of the plants, together with the amount necessary for working capital. The returns indicate that $1 of gas product required $3·47 of capital in 1850, $2·40 in 1860, $2·24 in 1870, $4·54 in 1890, and $7·49 in 1900.

The special schedule of inquiry for gas manufacture called for the amount of bonds issued by each company, and the rate of interest on the same; the amount of capital stock, preferred and common; and the amount of dividend paid during the year. Table III. contains a summary of the amounts reported in reply to these inquiries.

TABLE III.—*Gas Companies' Bonds and Stock,* 1900.

Bonds—	
Amount issued	$192,669,181
Interest paid during the year	9,471,575
Stock issued—	
Preferred	$26,143,882
Common	349,891,921
Total	$376,035,803
Dividend paid during year	15,842,138

In 1900, the total capital stock, as shown above, was $376,035,803, compared with $229,746,552 in 1890, an increase of $146,289,251, or 63·7 per cent. during the ten years. Of the capital stock, $349,891,921, or 93 per cent., was common, and the remainder preferred. The total capital reported as actually invested—$567,000,506—exceeds the capital stock by $190,964,703. Several establishments reported that they did not issue capital stock; and the companies operating both gas and electric plants reported it impossible to segregate the bonds and stocks so as to give the exact amount directly chargeable to the gas plant. In many instances, the amounts reported for the gas plant were unquestionably too small.

The schedule of inquiry for 1890 was the first which contained questions designed to show the cost of manufacture other than for wages and materials. The questions of the twelfth census relating to miscellaneous expenses were made as nearly uniform as possible with those of the previous census. The amount paid for insurance, ordinary repairs, interest, advertising, &c., is the principal item of the miscellaneous expenses reported. This amount does not include any allowance for depreciation or for expenses incurred for new equipment, extension of mains, &c. Interest in this item is not to be considered the same as the interest on bonds in table IV.; but includes only the comparatively small sums paid for money or credit obtained from time to time during the year, incident to the conduct of the business. The next to the largest item of miscellaneous expenses is the amount paid for taxes.

Table V. is a comparative summary of the cost of the different materials used in 1890 and 1900, with the proportion each is of the total cost of materials, and the percentage increase from 1890 to 1900.

TABLE V.—*Cost of Materials Used in Gas Manufacture.*

	1900.		1890.		Percentage Increase.
	Amount.	Per Cent. of Total.	Amount.	Per Cent. of Total.	
Coal	$7,164,472	34·8	$8,797,851	62·7	*18·6
Coke	726,736	3·5	190,342	1·4	281·8
Oil	8,168,657	39·6	3,483,005	24·8	134·5
Water	204,402	1·0	†	..	..
Natural Gas	†	..	19,389	0·1	..
Oxide of iron	†	..	51,936	0·4	..
Lime	†	..	426,530	3·0	..
Fuel	1,082,844	5·3	524,249	3·7	106·6
Mill supplies	149,439	0·7	†	..	..
All other materials	2,395,430	11·6	543,725	3·9	340·6
Freight	713,376	3·5	†	..	..
Total	$20,605,356	100·0	$14,037,087	100·0	46·8

* Decrease. † Not reported separately.

The total cost of materials represents an increase of 46·8 per cent. Oil, crude and refined, is the largest single item of materials used in the manufacture of gas in 1900; its cost forming 39·6 per cent. of the total cost of materials, as compared with 24·8 per cent. in 1890. The relatively larger amount expended for oil in 1900 is due to the higher price of crude petroleum in 1900, and to the more extended use of oil for the purpose of enriching water gas, the manufacture of which has increased since 1890 much more rapidly than that of coal gas. This is evidenced by the fact that the cost of coal, which was the principal item of expense in 1890, forming 62·7 per cent. of the cost of materials, is second item of expense in 1900, forming but 34·8 per cent. of the total. In 1890, coal gas formed 49·7 per cent. of the value of products, compared with 38·1 per cent. for water gas. The form of inquiry for 1900 did not call for the amount of each variety of gas sold; and it is impossible to arrive at the exact proportion of each kind from the materials used, since hard coal, coke, and oil are all used in the manufacture of water gas; but the conclusion seems to be warranted that more than 75 per cent. of the gas manufactured during the census year was water gas. A water-gas plant is, in several respects, more advantageously operated than other systems of production. Probably the chief advantage is the smaller expenditure for labour. Moreover, the illuminating power of the water gas is higher than that of coal gas.

TABLE IV.—*Miscellaneous Expenses of Gas Companies in* 1890 *and* 1900.

	1900.		1890.		Percentage Increase.
	Amount.	Per Cent. of Total.	Amount.	Per Cent. of Total.	
Rent of works	$820,241	5·6	..	..	..
Rent of offices	344,139	2·3	..	..	..
Total amount paid for rent	$1,164,380	7·9	$630,711	8·1	84·6
Taxes, including royalties and special tax	3,577,037	24·2	2,227,122	28·5	60·6
Lamps and appliances purchased for sale	1,392,206	9·4	..	..	..
Advertising, interest, insurance, repairs, and other sundry expenses	8,635,399	58·5	4,941,552	63·5	74·8
Total	$14,769,022	100·0	$7,799,385	100·0	89·4

The cost of oil and coal varies with the distance from the source of supply, and the quality used in different sections of the country also varies noticeably. Furthermore, in many instances the materials used were bought delivered; and it was found impossible to separate the amount chargeable to freight. The number of gallons of oil used is given as 194,857,296, costing $8,168,657, or an average of 4·2 c. per gallon; the number of tons of coal consumed was reported as 2,487,287, costing $7,164,472, or an average of $2·88 per ton. The figures given make no allowance for material bought delivered. The number of bushels of coke includes 2,733,034 bushels of bye-product coke used by the plants reporting the same, for which no value is given. If this quantity is deducted from the total amount reported, it shows that 12,481,759 bushels of coke were purchased for $726,736—an average cost of 5·8 c. per bushel.

The total value of products—$75,716,693—as given in Table I. for 1900, as compared with $56,987,290 for 1890, shows an increase of $18,729,403, or 32·9 per cent., during the past decade. The value of the principal product, gas sold, amounted to $69,432,582—an increase of $17,565,751, or 33·9 per cent., over the $51,866,831 reported for 1890. The value of bye-products—$6,284,111—including $2,000,907 received from rents and sales of appliances, formed 8·3 per cent. of the total value of products in 1900, and showed an advance of 22·7 per cent. over the $5,120,459 reported in 1890. The bye-products include tar, coke, and ammoniacal liquor; but the quantities and values of each were not reported separately. The amount reported as the total value of all products does not include the value of the gas and bye-products consumed at the offices and works, or of the gas lost by leakage; nor does it include returns for several gas companies and so-called pipe-line companies who did not manufacture gas, but purchased it for distribution from gas-manufacturing establishments.

The total quantity of gas sold for lighting and heating, as reported by the 877 gas establishments from which returns were received, was 67,093,553,471 cubic feet. In addition to this, the special report on the manufacture of coke shows that there were six establishments manufacturing gas as a bye-product, which they sold to gas manufacturers or to distributing companies to be resold for lighting and heating purposes. The total quantity of gas manufactured and disposed of in this manner was 1,171,942,697 cubic feet. A combination of the latter quantity with that reported for gas companies shows that in 1900 the total sold was 68,265,496,168 cubic feet, as compared with 36,519,511,510 cubic feet reported for 1890—an increase of 31,745,984,658 cubic feet, or 86·9 per cent. The gas manufactured and sold by coke companies was valued at $225,022—an average of 19·2 c. per 1000 cubic feet, compared with an average for the United States of $1·035 for retort and water gas. In this connection, however, attention is called to the fact that the consumer does not receive gas for this price, as establishments using the bye-products system do not sell directly to the consumer.

The average price of gas in 1890 was $1·42 per 1000 cubic feet; while in 1900 it had fallen to $1·035—a decrease of 38·5 c., or 27·1 per cent. This average is computed from the totals of the whole number of establishments from which reports were received, and must not be assumed to be indicative of the price in any particular section of the country.

Table VI. shows the total quantity and value of gas sold, and the average price per 1000 cubic feet in each group of States for 1900. The greatest bulk of gas was sold in the North Atlantic division, which consumed 39,176,052,733 cubic feet, or more than the combined product of the four other groups of States, and 58·4 per cent. of the total quantity sold in the United States. The average price per 1000 cubic feet was 98·5 c., which was practically the same as was given for the North Central division, and less than that reported for any of the remaining groups. The State of New York, with 20,741,546,599 cubic feet, at an average price of 95·7 c., used more than any other, and more than the combined total of the other States in this group, or all the States in any other group. The consumption constituted 30·9 per cent. of the total for the United States. The group producing the least quantity was the South Central division, with 1,394,252,117 cubic feet, at an average price of $1·572 per 1000. The smallest quantity sold was in New Mexico—4,665,000 cubic feet, at an average price of $2·402.

TABLE VI.—*Quantity, Value, and Average Value per* 1000 *Cubic Feet of Gas Manufactured in* 1900.

Group of States.	Quantity Gas Sold.	Value.	Average Value per 1000 C. Ft.
North Atlantic division	39,176,052,733	$38,605,165	$0·985
South ,, ,,	3,910,272,412	4,681,123	1·197
North Central ,,	20,302,466,676	20,061,031	0·988
South ,, ,,	1,394,252,117	2,199,068	1·572
Western ,,	2,310,509,533	3,886,195	1·682
Total United States .	67,093,553,471	$69,432,582	$1·035

The price per 1000 cubic feet varied from 83·2 c. in Pennsylvania to $4·50 in Nevada. Proximity to the coal and oil producing districts gives to Pennsylvania the minimum average rate, while distance from source of supplies and limited transportation facilities are accountable for the high price in Nevada.

The quantity of gas sold in New York City was 18,180,821,125 cubic feet, at an average price of 90·5 c., or $46,457,822 in the aggregate. This represents 27·1 per cent. of the total quantity sold in the United States during the census year. In this connection, it is interesting to compare the quantity, value, and average price obtained in Chicago, Philadelphia, St. Louis, and Boston, which, after New York, are the largest cities in the United States in the order named. The quantity sold for public use in Chicago reached 8,367,801,185 cubic feet, valued at $7,288,187, or an average of 87·1 c. per 1000 cubic feet; in Philadelphia, 7,055,559,210 cubic feet were sold for $5,372,774, or an average of 76·1 c. This is the lowest average price reported in any city. St. Louis consumed 1,607,230,800 cubic feet, valued at $1,494,616, or an average of 93 c. per 1000 cubic feet; Boston, 2,510,635,235 cubic feet, with a value of $2,594,852, or $1·034 per 1000 cubic feet

ELECTRIC LIGHTING NOTES.

Profits at Worcester.

The accounts for the year's working of the Worcester Corporation Electric Light Department show a profit of £1385—by far the largest amount yet realized. During the first four years, the station was worked at considerable loss—reaching in the first year £1977, and showing a gradual reduction in subsequent years. These losses fell upon the rates of the city, and will be repaid from time to time as the profits accrue. The sum of £500 has been appropriated by the Finance Committee to assist the rates; and the remaining £885 the Electricity Committee desire should remain in their hands in case of emergencies.

Cheap Current at Cardiff.

The Electricity Committee of the Cardiff Corporation have endorsed an arrangement made by the Municipal Engineer (Mr. A. Ellis) with Sir John Gunn, on behalf of the Mount Stuart Dry Dock Company, for the supply of light and energy to the firm's works at Bute Docks. In face of the threatened opposition from the South Wales Electrical Power Company, this, the first of the big local undertakings to take electrically supplied energy from the Corporation, is noteworthy. The Corporation will supply current on the following terms: At the rate of 1d. per unit with a guaranteed consumption of 50,000 units per annum for every 100-horse power demanded; 1½d. per unit for the same amount of power with a guaranteed minimum consumption of 35,000 units per annum; and 1¾d. per unit for the same power with a guaranteed minimum consumption of 25,000 units per annum.

Louth and the Electric Light.

The Louth Town Council recently had a special sitting to formally sanction an application for a Provisional Order to enable them to have an installation of electric lighting. It will run them into an expense of £10,000; and it is to be hoped they will not have cause to regret it. However, from what passed at the meeting, there does not seem to be any necessity for incurring this outlay, if the improved lighting of the town is the main object in view. Some months ago, a Committee was appointed to approach the Gas Company on the matter; but before this could be done, the electric light scheme was sprung upon the town. Certainly, it is only fair that the Company should have an opportunity of showing the ratepayers what they can do before a costly scheme is embarked upon. If they are reluctant to move, they may then be left severely alone. The application for the Order was sanctioned *nem. dis.*

Reduction of Price in Liverpool.

At the meeting of the Liverpool City Council last Wednesday, Mr. R. Dart, the Chairman of the Electric Power and Light Committee, proposed the confirmation of the following recommendation of the Committee: "That from the end of the present quarter the prices for electrical energy supplied for lighting to any consumer in any one establishment be as follows: Up to 3000 units per quarter, 3¾d. per unit; beyond 3000 units per quarter, 3d. per unit; and that the other prices charged for electrical energy remain as at present." He said that the Committee proposed by this recommendation to reduce the price from 4d. to 3d., which was just half the price the public were paying when the electric supply was taken over by the Corporation. Alderman F. Smith seconded the proposition. Mr. H. Miles moved: "That the recommendation be amended by substituting 3½d. per unit for 3¾d. per unit." He maintained that this would be a desirable and profitable thing for the Committee to do, and would be to the benefit of the city generally. Alderman Watts seconded the amendment; but it was defeated by 36 votes to 16.

Electricity Supply Profits at Huddersfield.

The Electricity Department of the Huddersfield Corporation had an income from the supply of current last year of £19,024—an increase of £2634 over the previous year. The aggregate receipts exceeded the expenditure by £2561; and a proposal to transfer this to the depreciation and contingency account aroused considerable discussion at the meeting of the Town Council last Wednesday. Alderman Calvert said there were now a hundred motors in use at the works, and they had been paid for out of the receipts; otherwise the balance would have been more than £3300. Mr. F. A. Barras reminded the Council that the Electricity Committee were under an obligation to the ratepayers to the extent of something like £6000; and he advocated the repayment of £1000 out of the profits. Mr. Holroyd said that, seeing the department had a capital of over £100,000, the Committee felt they should build up a reserve fund of £10,000 before any sum was devoted to the relief of the rates. He had no doubt the Committee would, in the course of a few years, be able to repay the £6000, with interest. Mr. A. Sykes thought £1500 would be a handsome nucleus for the department; and he urged that the remainder of the profits should be appropriated for the "amelioration of the condition of the ratepayers." Mr. A. Chatterton regarded the amendment as a "senseless, unbusinesslike suggestion;" and after further discussion, the proposals of the Committee were approved by a substantial majority.

Financial Regulations Affecting Electricity Undertakings.

A special general meeting of the members of the Municipal Electrical Association was held on Friday at the Westminster Palace Hotel—the President (Mr. J. H. Rider) in the chair. The object of the meeting was to consider the best means of obtaining an alteration in the existing regulations as to the repayment of loans borrowed for the purposes of electricity supply undertakings, whereby local authorities are compelled to repay during the construction of works; the desirability of deciding the percentage which should be allowed for the depreciation of electricity undertakings; and the advisability or otherwise of recommending local authorities to form a reserve fund. After some discussion, a resolution was unanimously passed authorizing the Council, in conjunction with the Borough Treasurers' Association, to approach the President of the Local Government Board and the Secretary for Scotland with the view of obtaining a suspension of the sinking fund for the first three years. The second resolution was to the effect

that, as electricity supply undertakings had to be maintained in a thorough state of efficiency out of revenue, no depreciation or writing off of capital was necessary when the period of borrowing did not exceed 30 years. The third resolution affirmed the opinion of the Association that a reserve fund should be formed up to the limit allowed by the Provisional Order before any contribution was made to the rates. Both of these resolutions were also carried without dissent; and, in reply to one of the members, the Chairman stated that copies would be forwarded to every municipality in the kingdom.

Sheffield's Dissatisfaction.

The complaints which have been rife at Sheffield regarding the rise that has taken place in the electric lighting bills since the voltage was increased last summer, and which were referred to in last week's "JOURNAL" (p. 433), have culminated in a deputation of aggrieved consumers waiting upon Mr. Fedden, the General Manager of the Corporation Electric Supply Department. Reporters were not admitted to the proceedings. It is, however, stated that about twelve consumers were present, and that general dissatisfaction was expressed at the abnormal increase of electric light accounts during the past few months. Complaint was made of the lack of information upon which preferential rates to consumers were based; and also as to the system of rendering the accounts. The quality of the lamps supplied when the voltage was changed was severely commented upon. Mr. Fedden promised the deputation that these matters should have the consideration of the Electric Light Committee, which will meet shortly. He stated that a large number of dirty meters which did not register correctly were in use previous to the change of voltage; and that at the end of the financial year, which expires on March 25, they would be able to gauge more correctly the alleged increased consumption. He believed that the matter "would right itself in a month or two." The deputation must have derived small consolation from the explanation offered, for this points very clearly to the fact that it was the accounts that were rendered before the change of voltage which were at fault, and that the "abnormally increased" ones are correct When anything goes wrong, blame the meter; for there is at least no fear of it giving a "back answer."

A Village Electrically Lighted by Water Power.

Fladbury is a charming village on the Avon between Evesham and Pershore; and among other things, it possesses a mill. This mill was formerly driven by an old water-wheel; but this old-world arrangement has given place to two modern turbines, which furnish the mill with power, and drive a dynamo that furnishes the village with electric light. Leaving the station on a dark night, it is surprising to find the village street lighted by electricity, and to note that even the little shops and the cottages have their electric incandescent lamps. The credit for the enterprise belongs to a few of the principal residents, who conceived the idea that the power at their doors might be profitably employed in generating electricity. A Company was formed for the purpose, with a capital of £2000; but a subscription of £900 was found sufficient. The lighting started in February, 1900; and save for about 48 hours at the end of 1900, when the floods rose in the Avon Valley to a phenomenal height, the village has been electrically lighted each evening, and during early morning in winter. The working expenses of the little Company are not very great, being only about £70 a year. So smoothly and well do the turbines and dynamo work, that only one man is required to tend them. They supply light to about 280 lamps at a steady pressure of 220 volts at the centre of distribution; but, if necessary, the number can be increased to 320 lamps. When the demands of the village exceed that number, the Company will have to consider the advisability of putting down a second dynamo. The returns from rents are about £120 a year; and, though they have as yet paid no dividend, the Directors hope that in time they will be able to make the installation a profit-earning one, especially as new clients are now charged a little more per light than the original ones.

Bristol's New Electricity Station.

An important function took place last Wednesday, when the new generating establishment of the Bristol Electricity Department at Avonbank was inaugurated by the Lady Mayoress, in the presence of a large, brilliant, and representative company of citizens and visitors. The land, 11 acres in extent, was purchased for £16,571; the foundations and superstructure involved an outlay of £42,311; the machinery cost £48,098; and the trunk cables, joining the new works with the station at Temple Backs, cost £4861. In the course of an address by the Chairman of the Electricity Committee (Alderman George Pearson), he said their first idea in starting the works, nine years ago, was to provide, as a maximum, 20,000 lamps, and 100 arc lamps in the streets. But 20,000, which was to be the end of all things in Bristol, did not now represent their annual increase. At the present time they had 123,000 lamps in glow, and they had further, in heating and power, equal to another 18,000; so that they had the equivalent of 141,000 lamps in the city. The increase for the present year was eminently satisfactory; and he had not the slightest doubt that it would be the greatest advance they had had since the works had been in existence, and that would be something approaching 30,000 lamps. They were sometimes criticized for the prices they charged. They could not afford to make a charge that would not enable them to pay their way. Their price was for the ordinary light load 5d. per unit; and they had made arrangements which meant that a person consuming for the whole 24 hours, instead of a short period, would not pay more than 3¼d. As a matter of fact, though their figures said that they asked the public to pay 5d., they did not, on an average, pay more than 4¼d.; so that the charges were by no means high. If they were demanding excessive prices, people would not come to them in the way they did; and he was convinced that, so far as their charges were concerned, the public had not really very much to complain of.

Promises and Performances at Hastings.

That unsparing critic of electric lighting affairs at Hastings, Mr. Charles F. Botley, who holds the position of Electrical and Assistant Gas Engineer to the Hastings and St. Leonards Gas Company, has good grounds for further attacks on the Corporation in some figures published in a local paper from the Corporation's "Year Book for 1902." They show very clearly that promises in regard to electric lighting expenses are one thing, and performances quite another. It may be remembered that some time ago arrangements were made for the electric lighting of certain streets of the town, at an estimated cost of £676 5s. 10d., against £649 16s. 4d. for gas. The charge for the arc lamps was put at about £14 or £15 per annum; but Mr. Botley pointed out at the time that this was obviously wrong, and that the actual cost would probably be nearer £30 per lamp per annum. The figures above referred to show that he was not very far wrong. The total comes out at £1482. It is true that two more arc lamps are employed. But even allowing £58 for these (two at £29 each, the figure given in the "Year Book"), the £1424 left is a long way beyond the £676 of the estimates. When that was framed, the Committee gave the charge for current as 1¾d. per unit. Now it is 1½d., *plus* the lump charge of £12; making the total charge for current about 3¼d. per unit. Of course, as a writer in the local paper remarks, the increased charge for the lamps will have the effect of making the yearly balance-sheet of the electricity undertaking more favourable to the Committee, who have to make up for the loss shown on their last year's working. But, as he well points out, such a procedure does not say much for the manner in which they submit their estimates; and it will serve to render the ratepayers shy of accepting future assurances the Committee may make. In 1898 and 1899, the 53 lamps on the Front were charged at £50 apiece, or £2650 per annum; whereas the latest figure is £42 11s., or a total of £2255. It was shown by the returns for 1899 that the Corporation were supplying current to private consumers at less than cost price, and were making up the deficiency out of the rates by charging exorbitantly for the Front lamps. Why, it may be asked, have they lowered their price for these lamps, if not as a consequence of the Gas Company's offer to undertake the lighting for a smaller sum than that for which the ratepayers are debited? This is a matter deserving of investigation.

DEVONPORT WATER-WORKS PURCHASE QUESTION.

During the consideration of the question of the promotion of the Bill to authorize the acquisition of the local Water Company's undertaking, not more than 36 of the 60 members of the Devonport Town Council were in attendance yesterday week; and during the proceedings one or two members bitterly complained of this lack of interest and duty. The necessary resolution was moved by the Mayor, and seconded by Mr. Bond. A few questions of minor importance were put; and then followed a speech by Mr. Gill, from which it was gathered that, according to the last report of the Directors, the net income of the Company was £9429. Taking this figure and the number of years' purchase at 30, he found that the capitalized value of the concern would be £282,870; and 10 per cent. for compulsory purchase, even if this had to be paid, would be £28,287. He thought, however, they could leave the question of compulsory purchase almost out of the case. If the Company had paid maximum dividends, the question of prospective income did not arise at all. He had no complaint to make of the character of the water the Company supplied; but there were times when they did not give a constant and permanent supply. He appealed to the Council to look the question straight in the face. They were not getting a perfect water supply; and the arbitrator would make certain deductions from the £282,000, because the supply was not adequate. The Company proposed to raise £533,000 additional capital, and could they expect that any body of men would spend half that amount, and not want a fair return? The fact that the Company proposed to spend such a sum was one of the strongest arguments that the supply was inefficient. Instead, however, of incurring a heavy outlay, Mr. Gill suggested that Devonport should join hands with Plymouth in the matter of water supply. Dealing with the financial liability which would attach to the purchase, he said that, supposing the concern cost £250,000, it would involve them in interest at something under £8000 a year; and the sinking fund on £250,000, or even £350,000, on a 60 years' basis of 3 per cent., would amount to £1753 a year, which, with the £8000, came to £9753, as against an income which the year before last was £9429. Was this, he asked, a terrible thing for Devonport to face? For the first five years, the sinking fund would be suspended. Where, he also inquired, was the 1s. 2d. increase in the rates that was spoken of? That there would be an increase in the water-rate at the end of five years, he had no doubt; but he did not believe it would be more than 1d. or 2d. The motion was opposed by Mr. Allen, who considered the small attendance showed that, at the private meeting, members voted without a thought, and had stopped away now because they had heard the voice of their masters—the ratepayers. The purchase of the water undertaking would result in an increase of the rates from 6d. to 1s. It was pointed out by Mr. Banbury that Mr. Gill had changed front. Last year he stated publicly that the purchase was out of their reach. Now he had brought the figures down to £250,000. But no member in his senses would think it possible to purchase at that sum, seeing that they offered £350,000 for the concern four years ago, which was subsequently watered down to £300,000. Since the Company were offered £350,000 four years ago, they had made a new reservoir and laid miles of mains. In the interests of those he represented and of himself—and he was a large ratepayer in the town—he was dead-against the proposal. There was some question during the meeting as to the position of St. Budeaux, the inhabitants in which district pay water-rates to Plymouth. On this point, the Town Clerk said that at a previous meeting he expressed the opinion that the proposition that so long as St. Budeaux had to pay water-rates to Plymouth, she ought not to be called upon to contribute to the losses on the Devonport water undertaking, if acquired by the Corporation, was a fair and reasonable one when coupled with the converse proposal that, under the same circumstances, she should not be permitted to participate in the profits if the acquisition resulted in profit instead of loss. He had since seen the Corporation Parliamentary Agents, who saw no reason why, if the Council desired it, a clause to that effect should not be inserted. The resolution was put and carried—the voting being 33 in favour, 10 against, and 1 neutral. A further motion authorizing opposition to the Company's Bill was carried.

THE LONDON WATER BILL.

The Bill introduced by the President of the Local Government Board (Mr. Long) for "establishing a Water Board to manage the supply of water within London and certain adjoining districts, for transferring to the Water Board the undertakings of the Metropolitan Water Companies, and for other purposes connected therewith," contains 40 clauses, divided into seven groups, headed as follows: (1) Establishment of Water Board; (2) Transfer to Water Board of Undertakings of Companies; (3) Redemption of Debenture Stock; (4) Financial Provisions; (5) Arbitration; (6) Miscellaneous; and (7) Transitory Provisions. Appended to the clauses are five schedules. The following is an epitome of the Bill.

Establishment of Water Board.

Clause 1 sets forth that a Board, to be called the Metropolitan Water Board, shall be established for the purpose of acquiring by purchase, and of managing and carrying on, the undertakings of the Companies mentioned in the first schedule (referred to as the Metropolitan Water Companies), and generally for the purpose of supplying water within the area described in the second schedule, subject to such alterations therein as may be made by or under the Act. This area is referred to as "the limits of supply." The Board is to consist of a Chairman, a Vice Chairman, and 67 members; the Chairman and Vice-Chairman to be appointed by the Board, and the members by the constituent authorities specified in the third schedule; and the number to be appointed by each authority is to be that mentioned with respect to that authority in the schedule. The Board will pay to the Chairman and Vice-Chairman such salaries as may be determined.

Clauses 2 to 8 deal with the transfer of the undertakings subject to the provisions of the Act, as from "the appointed day" the undertaking of each of the Companies is to be transferred to the Board, subject to any liabilities with respect to debenture stock and any mortgage or other debt, liability, or obligation then existing. The Board will issue to each Company, in consideration for their undertaking, such an amount of water stock created under the Act as may be agreed upon, or, in default of agreement, as may be determined by arbitration under the Act. As from the appointed day, the Board will hold the undertaking of each Company, and may exercise all their rights, powers, authorities, and privileges, and be subject to all their duties, obligations, and liabilities, whether local or general, and the charters, orders, and other provisions relating to them in like manner, *mutatis mutandis*, as if they were the Company.

The water stock to which a Company become entitled in consideration for the transfer of their undertaking is to be issued by the Board within three months after the appointed day, or after the ascertainment of the amount thereof, whichever date is the later; and it is to be applied and distributed in the manner provided with respect to the Company in the fifth schedule. As soon as it is applied and distributed in accordance with the provisions of the Act, the Chamberlain of the City of London is to transfer to the Board the water stock allotted to him in respect of the stock or shares of the Company held by him, and applicable as a sinking fund towards the purchase of the undertaking of the Company under their Special Acts, and at the same time transfer to the Board any debenture stock or money held by him, and applicable to the same purpose. Any water stock or debenture stock so transferred to the Board is to be forthwith cancelled and extinguished.

As from the appointed day, such parts of the boroughs of Croydon and Richmond, and of the urban districts of Cheshunt, Enfield, Tottenham, and Ware, as are within the limits of supply, shall cease to be so, and the powers, rights, and duties of the Councils of those boroughs and districts with respect to the supply of water are to extend throughout their respective boroughs and districts; and all such waterworks and plant transferred to the Board under the Act (other than the mains and pipes or other apparatus or works necessary for supplying with water any other place within the limits of supply) as are situate in any such borough or urban district, are to be transferred to the Council of the borough or district in which they are so situate, upon such terms as may be agreed upon between the Council and the Board, or, in default of agreement, as may be determined by arbitration under the Act. The Council are to pay to the Board, in respect of the loss of the right to supply water in the area which ceases to be within the limits of supply, such sum as may be agreed upon or settled in the manner already mentioned. If required to do so by the Council of the borough of Croydon or Richmond, or of the urban district of Cheshunt, Enfield, Tottenham, or Ware, or by the Council of any rural district situate wholly or partly within the limits, the Board are to supply water in bulk to that Council in such quantities, at such price, and generally upon such terms and conditions as may be agreed upon, or determined by arbitration.

Redemption of Debenture Stock.

Clauses 9 and 10 relate to the redemption of the debenture stock. They set forth that, within two years from the appointed day, all irredeemable debenture stock is to be extinguished, and the Board are to issue in substitution therefor the amount of water stock to which they are severally entitled.

The amount of such stock is to be sufficient to produce the same sum by way of income as the debenture stock in substitution for which it is issued. Within 80 years from March 31, 1903, the Board are to purchase or redeem and pay off all redeemable debenture stock and all mortgage debts; and any stock so purchased or redeemed is to be extinguished and cancelled.

Financial Provisions.

The next clauses (11 to 17) contain the financial provisions of the Bill. There is to be established a water fund, and all receipts of the Board are to be carried to, and all payments made out of, it. Any sum required to meet a deficiency in the fund is to be apportioned among the City of London and the parishes in the County of London and in the boroughs and urban districts outside London the Councils of which are for the time being entitled to be represented on the Board, in proportion to the rateable value on the preceding 6th of April of the hereditaments at that date supplied with water by the Board or any Metropolitan Water Company in the City and each parish. The Board are to issue precepts for the sums apportioned to the City and the several parishes liable, and the Council and Overseers respectively are to pay the amount specified.

The Board may borrow for the purpose of (*a*) paying any money (other than that payable by way of interest on purchase-money) payable under the Act to a Metropolitan Water Company, (*b*) purchasing, redeeming, or paying off any debenture stock or mortgage debt, (*c*) executing any work authorized by the Acts relating to any of the Metropolitan Water Companies, so that the amount does not exceed the amounts which were immediately before the appointed day under those Acts authorized to be raised for that purpose, but have not been raised before that date, and (*d*) discharging any compensation payable under the Act otherwise than by way of annuity. All moneys borrowed are to be raised by the issue of water stock, unless the Local Government Board consent to some other mode of obtaining it; and, where they do so consent, any money raised, with the interest thereon, is to be charged on the water fund or on such property or revenues of the Board as the Local Government Board may sanction. Money borrowed for the purpose of making any payment to a Metropolitan Water Company, or of redeeming, purchasing, or paying off any debenture stock or mortgage debt, is to be repaid within the period of 80 years from March 31, 1903; but if borrowed for any other purpose, within such period not exceeding 60 years from the date of borrowing as the Board, with the consent of the Local Government Board, may determine.

For the purpose of enabling the Board to raise money which they are authorized to borrow under the Act, and to issue any water stock which is to be issued to any Metropolitan Water Company, or to the holder of any debenture stock or mortgage debt, they may create a sufficient amount of stock, to be called Metropolitan Water Stock, bearing interest at the rate of 3 per cent. per annum. Water stock, and the interest thereon, is to be charged on the water fund and on all the revenues of the Board. The provisions of section 52 of the Public Health Acts Amendment Act, 1890, which relates to the issue of stock by local authorities, are to apply to water stock as if it were stock created under that section, and the Board were an authority mentioned therein. Water stock is to be included among the securities in which a trustee may invest under the powers of the Trustee Act, 1893.

The remaining clauses in this group contain provisions as to the discharge of loans, &c.; the keeping of accounts and the audit thereof; the borrowing powers of certain local authorities; and the application of capital receipts.

Arbitration.

Clause 18 contains the provisions as to arbitration, and is of sufficient importance to be given in full. It is as follows:—

1.—For the purpose of arbitrations under this Act, a Court of Arbitration shall be constituted, consisting of three Commissioners; and the Right Hon. Sir Edward Fry, Sir Hugh Owen, G.C.B., and Sir John Wolfe Barry, K.C.B., shall, as from the appointed day, be the Commissioners.

2.—If any vacancy in the Court of Arbitration occurs by reason of death, resignation, incapacity, or otherwise, the Local Government Board shall appoint a person to fill the vacancy, and so from time to time as occasion requires.

3.—The Court of Arbitration may appoint or employ such number of officers and persons as they may think necessary for the purpose of the execution of their duties under this Act, and may remove any officer or person so appointed or employed.

4.—There shall be paid to the Commissioners, and to any officer or person appointed or employed under this section, such salaries or other remuneration as the Local Government Board may assign; and that remuneration, and all expenses of the Court of Arbitration incurred with the sanction of the Local Government Board in the execution of this Act, shall be paid by the Water Board.

5.—On holding any inquiry for the purposes of this Act, the Court of Arbitration, and any Commissioner or officer of the Court, shall have the same powers as an Inspector of the Local Government Board has on holding a local inquiry under the Public Health Act, 1875; but a person summoned to appear at the inquiry may be required to go or travel more than ten miles from his place of abode

6.—Subject to the provisions of this section, the authority of the Court of Arbitration shall extend to the settlement and the determination by them, on such terms and in such manner as they, in their absolute discretion, think most just and fit, of the matters referred to them, and also of such matters and questions (including any adjustment of accounts between the parties to the arbitration) as are, in their judgment, incidental thereto or consequential thereon, to the end that their award or awards may effect a final and equitable settlement.

7.—Every award, order, and other instrument made by, or proceeding from, the Court of Arbitration shall be binding and conclusive to and for all intents and purposes, and shall have the like effect as if it had been made by a Judge of the High Court, and shall be acted on, obeyed, executed, and enforced accordingly. No such award, order, or other instrument shall be removable by any writ or process into any of His Majesty's Courts; and the proceedings or acts of the Court of Arbitration shall not (except as hereinafter expressly provided) be liable to be interfered with or questioned by or in any Court or elsewhere, by way of *mandamus*, prohibition, injunction, or otherwise: Provided that the Court of Arbitration may, at any stage of the proceedings at an arbitration, and shall, if so directed by the Court of Appeal, state, in the form of a special case for the opinion of the Court of Appeal, any question of law arising in the course of the arbitration.

8.—The Court of Arbitration may act by two of their number, and notwithstanding any vacancy in their number. Subject as aforesaid, the Court may regulate their own procedure, and the procedure at an inquiry held by a Commissioner or officer of the Court.

9.—In determining the amount of water stock to be issued to any Metropolitan Water Company, the Court of Arbitration shall not make any allowance in respect of compulsory sale, and shall not take into account any enhancement or depreciation of the market value of any stock or shares of the Company which, in the opinion of the Court, was caused by, or resulted from, the passing, or the anticipation of the passing, of this Act; but the Court may make such allowance as they think just for covering any expenses which have been or are likely to be incurred in consequence of the passing of this Act, and which ought, in the opinion of the Court, to be borne by the Water Board.

10.—The costs of any Metropolitan Water Company incurred in an arbitration under this Act, shall, except and so far as the Court of Arbitration

otherwise determine, be borne by the Water Board, and the costs of any other person attending an arbitration under this Act shall be in the discretion of the Court of Arbitration; and that Court may order the taxation of any costs in such manner as they think fit.

11.—The Arbitration Act, 1899, shall not apply to arbitrations under this Act.

Miscellaneous.

We now come to the group of clauses (19 to 28) containing the miscellaneous provisions. They confer upon the Board power (*a*) to manage, alter, enlarge, and, with the consent of the Local Government Board, to alienate, any land or buildings transferred to them under the Act, or otherwise vested in them; (*b*) to acquire, purchase, or take on lease or exchange any lands, or any easements or rights over or in land, whether situate within or beyond the limits of supply, and to acquire, hire, erect, and furnish such buildings and offices as they may require, whether within or beyond the limits of supply; and (*c*) to promote or oppose any Bill in Parliament and prosecute or defend legal proceedings. If at any time, by reason of the variation of population, or the constitution or inclusion within the limits of supply of any borough or urban district, it is proved to the satisfaction of the Local Government Board that the representation on the Water Board of any borough or district ought to be varied, or that any borough or urban district within the limits of supply ought to be represented, the Local Government Board may make an order altering the representation, and thereby alter the total number of members of the Board. They may also, on the application of the Board, include within the limits of supply any district which, having as a rural district or as a part thereof ceased to be within the limits of supply, has subsequently been made an urban district, and may wholly or partial y repeal, alter, or amend any enactment relating to all or any of the Metropolitan Water Companies which is contained in any Local Act. They are to be empowered to hold such local inquiries as they think fit in relation to any matters to which their sanction, approval, or consent is required by the Act, and in relation to any other matters connected with their powers and duties under it; and their expenses are to be paid by the Water Board, or by such authorities and persons, and out of such funds and rates, as the Local Government Board may direct. They may include the salary of any inspector or officer of the Local Government Board engaged in the inquiry or proceeding, not exceeding three guineas a day. The Water Board are to make to the Local Government Board an annual report of their proceedings, and it is to be laid yearly before Parliament by that Board. The Water Board are also to give to the Local Government Board such returns, statistics, and information with respect to the exercise of their powers as that Board may require. As soon as a Metropolitan Water Company have applied and distributed the water stock issued to them in consideration for their undertaking, they are to be dissolved in manner provided in the fifth schedule. This provision is not, however, to apply to the New River Company.

In the definition clause, it is explained that the expression "undertaking" includes, in the case of any Metropolitan Water Company, all such property, real and personal—including cash balances, reserve funds, investments, and all other interests and rights in, to, and out of the property, real and personal, and obligations, and things in action—as may be in their possession, or belonging to them, immediately before the appointed day; and all books, accounts, and documents relating thereto. In the case of the New River Company, however, provision is made that the "undertaking" is not to include any landed estate, houses, or property not directly used for, or connected with, their water supply, nor any books, accounts, or documents relating solely thereto. The expression "appointed day" means the 1st of January, 1903, or such other day, not being more than twelve months later, as the Local Government Board may appoint, either generally or with reference to any particular provision of the Act. The enactments mentioned in the sixth schedule are, as from the appointed day, to be repealed to the extent there specified. The Act may be cited as the Metropolis Water Act, 1902.

Transitory Provisions.

We now come to the last group of clauses (29 to 40), containing the transitory provisions. The first of these clauses sets forth that until the appointed day the undertaking of each Metropolitan Water Company is to be maintained and carried on by the Company; but if the Water Board think that any appointment to any office or service of the Company, or any contract with respect to any matter connected with the undertaking, or any alteration in the rate of salary or wages payable to any officer or servant, made subsequently to the introduction of the Bill for the Act, was not reasonably necessary in the ordinary course of business, they may give notice in writing to the Company to that effect within three months after the appointed day. If they give such notice, it is to be referred to the Court of Arbitration, to determine whether or not the appointment, contract, or alteration was reasonably necessary.

The next clause contains provisions for enabling the Companies to carry on their business, &c., after the appointed day. In order that they may prepare and conduct their cases for arbitration, enter into agreements with the Water Board, discharge their liabilities, and generally carry on their business, any Company may, after the appointed day, temporarily retain for their own use such money, offices, books, accounts, and documents, and the services of such officers and servants, as may before the appointed day be agreed upon with the Board, or, failing agreement, be determined by the Local Government Board; and any officer or other authorized person is to have free access to all the works transferred to the Board, and to all books, accounts, and documents of the Company in the possession of the Board, for the purpose of inspecting, copying, and making extracts therefrom. Access to the works and books is also to be allowed to persons appointed by the Board.

The next clauses provide for the payment of dividends to the Companies till the issue of water stock, and for the Board obtaining temporary advances to carry on the business. The amount of the latter is not to exceed £500,000, except with the sanction of the Local Government Board, and it is to be repaid within five years. Pending proceedings and existing contracts, except those relating to the New River Company's landed estates, are to continue and remain in force; and also all "bye-laws, rules, regulations, and scales of water charges made or enforceable by any Metropolitan Water Company," so far as they are consistent with the provisions of the Act, until they are repealed, altered, or superseded.

The existing officers and servants are dealt with in clause 36, which is as follows:—

1.—Subject to the provisions of this Act, every officer and servant employed by a Metropolitan Water Company upon or in connection with the undertaking immediately before the appointed day (in this Act referred to as "an existing officer" and "an existing servant") shall, as from the appointed day, become an officer or servant of the Water Board, and shall hold his office or situation by the same tenure and upon like terms and conditions under the Board as he would have held the same under the Company if this Act had not been passed; and while performing the same duties shall receive not less salary, wages, or pay, and be entitled to not less pension (if any) than he would have been entitled to if this Act had not been passed.

2.—Every existing officer and existing servant shall perform such duties in connection with the water undertaking of the Water Board as they may be required to perform by the Board.

3.—The Water Board may abolish the office or situation of any existing officer or servant which they deem unnecessary; and any existing officer or existing servant required to perform duties such as are not analogous, or which are an unreasonable addition to those which, as an officer or servant of the Company, he was required to perform, may relinquish his office or service.

4.—Every existing officer or existing servant whose office is so abolished, or who so relinquishes his office or service as aforesaid, or who otherwise suffers any direct pecuniary loss in consequence of this Act, shall be entitled to be paid by the Water Board compensation for such pecuniary loss; regard being had to the conditions on which his appointment was made, the nature of his office or employment, the duration of his services, and any other circumstances affecting the case.

5.—Subject to the provisions of this section, the provisions contained in section 120 of the Local Government Act, 1888, relating to compensation to existing officers, shall apply to any claim for compensation by an existing officer or an existing servant, with the substitution of references to the Water Board and water fund for references to the County Council and county fund.

The Water Board are to pay the Auditor of the accounts of the Companies such annual or other sum by way of compensation for loss of office as the Local Government Board may think just.

Until the quantity of water to be supplied to the Council of a borough or urban district which under the Act ceases to be within the limits of supply has been determined, the Water Board are to supply to each Council such quantity as they may require, not exceeding 350 gallons per diem for each supply within the borough or urban district, as ascertained from the register of supplies in existence on the appointed day; and the price to be paid for such water is to be determined in accordance with the Act relating to the price to be paid for water supplied in bulk to the Council of a borough or district.

If any difficulty arises with respect to the establishment of the Water Board, to the appointment of the first members, or to the first meeting thereof, the Local Government Board may, by order, make any appointment, or do anything which appears to them to be necessary or expedient for the establishment of the Board, and the holding of the first election and the first meeting. Any order so made may modify the provisions of the Act so far as may appear to the Local Government Board to be necessary or expedient for carrying it into effect.

The concluding clause specifies that all costs, charges, and expenses connected with preparing, applying for, obtaining, and passing the Act, incurred by the Local Government Board, are to be repaid to them by the Water Board when established.

The Schedules.

The first schedule contains the names of the eight Metropolitan Water Companies and the Staines Reservoirs Joint Committee. The second defines the limits of supply as "the parishes and places in which, at the date of the passing of this Act, any of the Metropolitan Water Companies are authorized to supply water, and the parishes of Sunbury, Chessington, and Cuddington." A note, however, sets forth that the area is liable to variation under the provisions of the Act. The third schedule shows, in tabular form, the scheme of representation on the Board. It is as follows:—

London.—The London County Council, ten; the Common Council of the City of London, two; the Council of each of the Metropolitan Boroughs of Islington, Kensington, Lambeth, St. Pancras, Stepney, and Westminster, two; and the Council of each of the other Metropolitan Boroughs, one each	46
Essex.—The County Council of Essex, one; the West Ham Borough Council, two; the Urban District Councils of East Ham, Leyton, and Walthamstow, one each; and the combined Urban District Councils of Buckhurst Hill, Chingford, Loughton, Waltham, Holy Cross, Wanstead, and Woodford, one.	7
Kent.—The County Council of Kent, one; the Urban District Councils of Beckenham, Bromley, Chislehurst, and Penge, one; and the Urban District Councils of Bexley, Dartford, and Erith, one	3
Middlesex.—The County Council of Middlesex, one; the Urban District Council of Willesden, one; the Ealing Borough Council and the Urban District Councils of Acton and Chiswick, one; the Urban District Councils of Brentford, Hampton, Hampton Wick, Hanwell, Heston and Isleworth, Sunbury, Teddington, and Twickenham, one; and the Urban District Councils of Edmonton, Hornsey, Southgate, and Wood Green, one . . .	5
Surrey.—The County Council of Surrey, one; the Kingston Borough Council and the Urban District Councils of East and West Molesey, Esher and the Dittons, Ham, and Surbiton, one; and the Urban District Councils of Barnes, the Maldens and Coombe, and Wimbledon, one	3
Hertfordshire.—The County Council of Hertfordshire.	1
River Conservancies.—Thames and Lea, one each	2
Total	67

The fourth schedule is devoted to the constitution and proceedings of the Board; the fifth is to be settled after communication with the Companies; and the sixth indicates which portions of the Metropolis Water Acts, 1852 and 1871, are to be repealed.

LONDON COUNTY COUNCIL AND THE WATER QUESTION.

Opposition to the Government Bill.

A Public Meeting, convened by the Progressive party of the London County Council, was held at St. James's Hall on Monday evening last week—Mr. T. M'KINNON WOOD in the chair—"to protest against London's water supply being handed over to a Board of Works without any popular control." There was a numerous attendance, but the hall was not full.

The CHAIRMAN said the question of water supply was an important one for London; and the object of the meeting was to prevent the Government dealing with it as they had done with the telephone question. The financial portions of the Water Bill were not satisfactory. There were, however, several proposals that were excellent; but they were every one taken from the London County Council's Purchase Bill. If they were to take a "clean slate" and write down what they thought were the criteria of a good Water Authority, what would they set down? The first power given to the new authority was to buy out the Water Companies by agreement or by arbitration. The authority should be one of experience; otherwise it would be at a disadvantage in its dealings with the Companies. And it should also be responsible to the ratepayers. It should be a good working body; and he put it to the meeting that the County Council was such a body, and the proposed authority was not. The Council had the qualification of publicity—it lived in the light of day; friendly criticism kept it up to the mark, and hostile criticism exposed its shortcomings. For these reasons, the Council was the natural authority to represent London. The object of the Government was to create an authority as far as possible removed from the electorate and from public control. It was a dangerous thing to depart from the principle that those who had the spending of the ratepayers' money should be liable to be called to account by the ratepayers. They were told that it was useless to argue on the matter, as the Government had made up their mind on the question. He would make a proposal: Let the Government pass their Bill through its second reading and refer it to a Committee; let them then refer the Council's Bill to the same Committee? Was that not a reasonable proposition? The proposal for the creation of a new authority was a reversal of the accepted principle of local government. This was a matter which exceeded even the London Water Question, for it concerned the future of London government. Were they not justified in asking the people of London to give their answer on so important an issue? And was there any doubt as to their reply?

Mr. DICKINSON moved the first resolution: "That this meeting strongly protests against the proposal to hand over the vast interests of London in its water supply to an irresponsible authority constructed on the discredited model of the Metropolitan Board of Works." He said the Government had thrown at the head of Londoners a Bill to which their representative body objected and would have none of. Its chief proposal was new, was without precedent, and was in direct contradiction to all the considered reports which had been presented to Parliament during the last few years. The Government intended to form a Trust with 46 members representing London, and 10 of these would be sent by the County Council and 36 by the Metropolitan Borough Councils. Why was this done? First of all because the Government realized that if they brought in a Bill which provided for terms of purchase which the Companies would accept the County Council would oppose it; and they thought that if they could cajole the Borough Councils into giving their approval to the proposal, they could say that, while it was true that the County Council opposed it, London as a whole was in its favour. The proposal sinned altogether against the good government of the Metropolis. He trusted the Borough Councils would consider the question from this point of view. The Borough Council of Woolwich had passed a resolution to the effect that it would be well to transfer the representation proposed to be given to the Borough Councils on the Water Board to the County Council; and he hoped other Boroughs would follow the example.

Lord TWEEDMOUTH seconded the resolution. He said the County Council was established to deal with questions affecting London as a whole, and this was one of them. It was a duty of the Council to always keep before them the subject of the water supply The power given to the proposed Water Board to determine the question of purchase by agreement or by arbitration must be got rid of. It was an absolute necessity that this business should be dealt with by arbitration alone, founded on the principle that every matter should he fully inquired into. He urged the meeting to lay it to heart that the Bill was impossible, and determine that it should not pass into law.

Mr. J. W. BENN and Dr. MACNAMARA, M.P., supported the resolution, which was carried with one dissentient.

Dr. W. J. COLLINS moved the second resolution: "That, as the London ratepayers have an enormous financial interest in securing fair terms of purchase and in retaining direct control of the expenditure of the rates, this meeting regards as most prejudicial and dangerous the proposal that these matters should be taken out of the hands of the County Council, and entrusted to a body over which the London ratepayers would have no effective control." He said that Tom Paine—venerable Radical—had said that a body who was responsible to nobody ought to be trusted by nobody. This exactly hit off the position in which the Water Board would be; and he entirely objected to the creation of a non-representative body for a particular service.

Mr. JOHN BURNS, M.P., seconded the resolution. He said he was alarmed at the administrative slight which the Bill imposed upon London; and, further, he resented the moral slight that was offered to London by the deliberate snubbing of London's chief, and, in his opinion, best body, the County Council.

Mr. JAMES STUART supported the resolution, and it was carried unanimously.

The Mid-Kent Gas Company have accepted the plans and estimates of Messrs. J. and H. Robus for the complete erection of carbonizing plant, with the firm's improved settings, to make 400,000 cubic feet of gas a day. Messrs. Robus have also secured the contract for the erection of the Company's oil-gas making plant.

GLASGOW CORPORATION WATER SUPPLY.

The Loch Arklet Scheme.

The Water Engineer of the Glasgow Corporation (Mr. James M. Gale, M.Inst.C.E.) has prepared a report on a scheme for obtaining a further supply of 10 million gallons of water daily from Loch Arklet, and for laying an additional main from the Gorbals works. He proposes to raise the level of the loch, and lead the water the efrom into Loch Katrine, as authorized by the Act of 1885. Under that Act, power was obtained to raise the level of the water in Loch Katrine 5 feet above its former top-water level, which, added to the 7 feet authorized by the Act of 1855, makes an available depth of 12 feet which can be drawn upon for the supply of the city. The additional 5 feet by which Loch Katrine will be raised is estimated to give a supply of 65 million gallons of water per day, which is the yield of the rainfall over the drainage area flowing into the loch. Under the same Act, power was obtained to construct a duplicate line of aqueduct from Loch Katrine to the service reservoirs at Milngavie. The aqueduct has been made of such dimensions as to convey 70 million gallons of water per day, which, added to the 40 millions per day which the old aqueduct will pass, makes a total of 110 million gallons. After deducting about 10 per cent. from this quantity to allow for stoppages in the flow and for repairs, there remain 100 million gallons per day for the supply to the city, exclusive of about 4 million gallons per day coming from the Gorbals works. The capacity of the two aqueducts to convey 100 million gallons per day is considered ample provision for many years to come. Assuming that the consumption of water increases at the rate of 2 million gallons per day per annum, the available quantity of 65 million gallons per day which can be drawn from Loch Katrine will be reached in 1907.

Dealing with the work to be done at Loch Arklet, Mr. Gale says he proposes to convert the loch into a large storage reservoir for the purpose of augmenting the supply of water which can be sent from Loch Katrine to the service reservoirs at Milngavie. Under the Act of 1885, power was obtained to raise the level of the water in Loch Arklet 25 feet above its ordinary summer level, by constructing an embankment about 750 yards from the lower end of the loch. It has been found on closer investigation that a much more satisfactory foundation can be obtained by moving the site of the embankment about a mile farther down the stream. This proposed alteration will cause the flooding of more land; but it will only be necessary to raise the level of the water in the loch 22 feet, which will give a storage capacity equal to the 25 feet over the original area. The quantity of water available from the loch, after providing for the compensation water to the Arklet Water, will be 10 million gallons per day; and this, added to the 65 million gallons available from Loch Katrine, will make a total of 75 million gallons per day available for the supply to the city. It is also proposed to lead the water from Loch Arklet directly into Loch Katrine, instead of conveying it to the lower end of the loch. Mr. Gale estimates the cost of the works, including land, wayleaves, and compensation to tenants, at £145,000. The Corporation have already paid for the feuing rights over the ground adjoining Loch Arklet, with the exception of the small additional area of watershed to be included in the proposal now submitted, and have also paid £3000 for the privilege of taking the additional 10 million gallons of water. The cost of laying the new 24-inch main for fully 5¾ miles from the Gorbals works, including payment for wayleaves to proprietors and damages to agricultural tenants, is estimated at £32,000; while £2500 additional will be required for two new filter-beds. Mr. G. H. Hill, M.Inst.C.E., Consulting Water Engineer to the Corporation of Manchester, who has on several previous occasions been conjoined with Mr. Gale in matters relating to the Glasgow Water-Works, has been asked to go over the plans for the works proposed to be executed at Loch Arklet, and to report thereon.

At the Meeting of the Glasgow Corporation last Thursday, the minutes presented by the Water Committee contained a recommendation that authority should be obtained to increase the borrowing powers of the Corporation from £3,500,000 to £4,000,000, for carrying out the extensions referred to in the foregoing report. In moving the adoption of the minutes, Mr. Carswell remarked that some people had been under the impression that the water supply at Loch Katrine was sufficient for the needs of the city for very many years. This was a mistake. It was the means of conveying the water to the city that were sufficient. The water was being drawn upon to such an extent, that the supply had been reduced to very narrow limits. During the last four years, the consumption for all purposes had increased at the rate of 2 million gallons per day each year; and if it continued at this rate, Loch Katrine would be practically exhausted by 1907. The new work was part of a scheme agreed to in 1885; but it would be necessary to obtain a fresh Provisional Order to go on with it and to borrow the money. Mr. M'Cutcheon seconded the motion. Mr. G. Mitchell suggested that the Committee should consider the advisability of having in the city a salt-water as well as fresh-water supply. Salt water could be used for such purposes as flushing, baths, and watering and cleansing streets, and it would to a great extent enable them to husband their fresh-water supply. It had been used in several towns in England, and he did not think engineering difficulties would stand in the way of its adoption in Glasgow. Mr. Carswell remarked that salt water was not good for washing streets; and, moreover, it would cost from £300,000 to £400,000 to bring it from the sea. Treasurer Murray was doubtful whether sufficient allowance had been made for the increase in the consumption of water. He thought the estimate that 2 million gallons per day would be sufficient for five years was too small. If the city went on extending, they might have an increase of 3 millions per day before 1907; and this would exhaust Loch Arklet. If they were to go to Loch Voil, negotiations would have to take place as to wayleave, water rights, and privileges of one kind and another; and he thought they should consider whether they were not delaying the matter unduly. Mr. M'Farlane said they wished to complete the scheme sanctioned by Parliament, and arrangements had been made with the proprietors round Loch Arklet with this view. The minutes were approved.

THE SOUTHPORT WATER UNDERTAKING.

Final Meeting of the Water Company.

On Saturday, the 15th inst., the shareholders of the Southport Water Company held their last annual meeting, under the presidency of the Chairman (Mr. T. Bland), prior to the works being transferred to the Southport, Birkdale, and West Lancashire Water Board, under the Act of last session. The accounts for the past year showed a satisfactory increase in the revenue of the Company. An interim dividend after the rate of 9 per cent. per annum on the original and "A" shares, and of 7 per cent. per annum on the remainder of the paid-up share capital, was paid last August, and the Directors recommended a final dividend after the same rates for the year. The Chairman, in presenting the report, said the results were quite in keeping with the past. The report having been adopted, discussion followed regarding the transfer of the undertaking to the Water Board, which was fixed for the 31st prox., and the terms upon which it is to be made. It was explained that the sum payable to the shareholders for their interest in the Company was £840,000; and that this sum, when divided, was equal to 33⅓ years' purchase of the maximum dividends payable to each shareholder. This amount, however, would be subject to certain adjustments yet to be arrived at. It was announced that the new Board would be willing to give to any shareholder in the Company the 3 per cent. stock of the Board at par, and interest thereon from the 31st of December last, in lieu of cash for his or her proportion of the purchase-money. Some of the shareholders thought that no deduction need be made, as the plant, &c., would be equal in value to the adjustments necessary. But it was stated that all this would be settled after the 31st of March. The officials were all re-appointed till that date, when the Company will cease to exist.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Corporation of Aberdeen have been experimenting for some time with the Kitson oil-lamps in the lighting of a portion of Union Street, which is their leading thoroughfare. In a report which was submitted to the Watching and Lighting Committee yesterday, it was stated that for the full annual lighting season of 3438 hours, the Kitson light would cost, for eighteen lamps, £278, which is equal to £15 9s. 2d. per lamp per annum, or 1s. 7½d. per hour for the whole eighteen lamps. The same number of arc lamps would cost £358, which is equal to £19 18s. 6d. per lamp per annum, or 2s. 1d. per hour for the eighteen lamps. Incandescent gas lighting would cost, for 69 burners, £133, which is equal to £1 18s. 8d. per burner per annum, or 9s. 3d. per hour for 69 burners. The capital outlay on lamps would be: For gas, £111; for electricity, £426; and for the Kitson light, £558. The Committee were divided upon the matter, but came to the conclusion to abandon the Kitson light and to adopt electricity. This extraordinary resolution has been come to in the full knowledge that gas lighting is by far the cheapest, both in original cost and in maintenance. The Committee seem to have been influenced by the fact that the eastern end of the street is already lighted by electricity; and in their opinion the lighting of the thoroughfares should be uniform. The Committee appear to have acted foolishly. Had they adopted electricity without making inquiry as to the cost of other lights, they would have been in error. But the error is much more grievous when, having inquired, and found electricity to be the most expensive light, they nevertheless adopt it. We might well ask what purpose the inquiry was intended to serve. A further question which might be put is where they find authority for the squandering of the ratepayers' money in the way proposed. If they went upon the principle of paying nearly three times more than is necessary for everything which they acquire in the name of the Corporation, well, I am afraid that not only would they be speedily turned out of office, but that the aid of the law would be invoked for the putting of a period to such an insane practice. Yet that is what is proposed to be done; and the reason they give for it they have themselves knocked the bottom out of by their inquiry. Having demonstrated that gas lighting is the cheapest, it is their duty, if they desire uniformity, to adopt it all along. But it appears that the community are to be made to suffer because of the false step which was taken when electricity was introduced. Is it too much to hope that other corporations may be enabled, by the help of the Aberdeen figures, to act a more creditable part than is being done there? In that case, the figures which the Commissioners have published will be valuable.

The "Dundee Advertiser" of yesterday's date contains the following paragraph: "The production and affairs of the gas-works are at present engaging the special consideration of the Dundee Town Council. A meeting was held yesterday of what may be regarded as a Select Committee appointed to consider and report upon certain matters the development of which has given rise to inquietude on the part of members. It appears that the return of gas obtained recently has fallen short of expectation, and that to such an extent as to exert, should the shortage be continued, a very appreciable effect on the finances of the department. For this state of matters, various reasons are assigned. On the part of some, the shortage is ascribed to defective coal—a matter having a very direct bearing upon the question of contracting to which considerable prominence has lately been given. By others qualified to express an opinion, the deficiency is attributed to defects in the construction of the retorts—a subject of very great moment, having regard to the fact that these (one of the most important parts of the reconstruction) were expected to greatly increase the efficiency of the gas-works. To these and to kindred subjects of gas administration the Committee devoted attention. At the meeting of the Gas Committee next week, reports on the conduct and output of the works will be submitted."

It is reported that the Gas Committee of the Dundee Town Council on Tuesday considered the question of what is called the defaulting coal

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 477.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	Nov. 13	6½	Bombay, Ltd. . . .	6¼—6⅜	..	4 16 4
40,000	5	,,	6½	Do. New, £4 paid	4¼—4½	..	5 9 5
380,000	Stk.	Feb. 13	12	Brentford Consolidated	260—265*	..	4 10 7
270,000	,,	,,	9	Do. New . . .	187—192*	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—133*	..	3 15 2
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	112—115	..	3 9 7
220,000	Stk.	Sept. 12	10	Brighton & Hove Orig.	210—215	..	4 13 0
246,320	,,	,,	7	Do. A. Ord. Stk. .	150—155	..	4 10 4
420,000	20	Sept. 27	10	British.	41—42	..	4 15 3
50,000	10	Feb. 13	12	Bromley, Ord. 10 p.c. .	23—25*	..	4 16 0
82,850	10	,,	9	Do. 7 p.c. . . .	18—23*	..	4 10 0
500,000	10	Oct. 11	6	Buenos Ayres (New) Ltd.	9¾—10¼	..	5 17 1
220,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	July 17	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept 27	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Oct. 11	12	Commercial Old Stock	265—270	..	4 8 11
236,425	,,	,,	9	Do. New do. .	203—208	..	4 6 7
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	,,	9	Continental Union, Ltd.	162—167	..	5 7 9
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	..	4 4 10
575,000	Stk.	Aug. 29	5	Crystal Palace Ord. 5 p.c.	122—127	..	3 18 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	123—128	..	3 18 2
486,090	10	Jan. 30	10½	European, Ltd. . . .	18½—19½	..	5 7 8
354,060	10	,,	10½	Do. £7 10s. paid	13½—14¼	..	5 8 8
15,243,200	Stk.	Feb. 13	4 7/16	Gas- 4 p.c. Ord. . .	92—93*	−2	4 14 7
2,600,000	,,	,,	3½	light 3½ p.c. max. .	89—91*	..	3 16 11
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	110—113*	+1	3 10 10
4,193,975	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	210—213	−1	4 13 11
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	99—101*	..	3 9 4
561,000	Stk.	Aug. 29	10	Liverpool United A .	232—234	..	4 5 6
718,100	,,	,,	7	Do. do. B .	171—173	..	4 0 11
306,083	,,	Dec. 30	4	Do. do. Deb. Stk.	118—120	..	3 6 8
75,000	5	Dec. 13	4	Malta & Medn., Ltd. .	4¼—5	..	4 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	107—111	..	4 10 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,595,832	Stk.	Feb. 21	4½	Newc'tle & G'tesh'd Con.	10.—10⅞*	+1	4 1 9
346,855	Stk.	Dec. 27	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	Nov. 28	8	Oriental, Ltd. . . .	7⅛—8	..	5 0 0
135,000	4½	,,	8	Do.	6⅞—7¼	..	4 19 4
15,000	1	,,	8	Do.	1⅞—1⅞	..	4 11 5
60,000	5	Sept. 27	7	Ottoman, Ltd. . . .	5⅞—6⅛	..	5 12 0
					* Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Oct. 11	7	River Plate Ord. . .	10¼—10⅜	+¼	6 10 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. .	95—98	..	4 1 8
250,000	10	Sept. 27	8	San Paulo, Ltd. . . .	11⅛—12⅛	..	6 8 0
135,000	Stk.	Sept. 12	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	243—245	..	4 1 8
523,498	,,	,,	10	Do. C	242—244	..	4 2 0
5,850,000	Stk.	Feb. 13	5	South Met., 4 p.c. Ord.	123—126*	..	3 19 4
1,627,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	92—94	..	3 3 10
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	104—108	..	4 12 7
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	100—103	..	3 17 8
120,000	Stk.	Aug. 29	5½	Tottenham and Edmonton A. 5 p.c.	122—127	..	4 6 8
260,520	,,	,,	4	Tottenham and Edmonton B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.	7—8	..	6 5 0
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—100	+2	5 0 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9¾—10¼	..	4 5 9
172,000	10	,,	6	Do. 7 p.c. .	12⅝—13⅜	..	4 8 11
140,900	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,599	Stk.	Dec. 30	11½	Chelsea, Ord. . .	315—325	..	3 10 9
150,000	,,	,,	5	Do. 5 p.c. Pref. .	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	..	3 2 1
175,785	,,	Sept. 27	4½	Do. 4½ p.c. Deb. .	142—147	..	3 1 3
1,720,560	Stk.	Oct. 11	7	East London, Ord. . .	200—210	−1½	3 6 8
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
1,018,046	,,	,,	3	Do. 3 p.c. Deb. .	97—99	..	3 0 7
700,000	50	Dec. 13	8	Grand Junction 10 p.c. max. .	112—117	..	3 8 5
310,000	Stk.	Sept. 27	4	Junction 4 p.c. Deb. .	127—132	..	3 0 7
708,000	Stk.	Feb. 13	16	Kent	300—310*	..	5 3 3
160,000	,,	,,	7	Do. New, 7 p.c. max. .	200—210*	..	3 6 8
1,043,800	100	Dec. 30	10½	Lambeth, 10 p.c. max. .	303—308	−2	3 8 2
406,200	100	,,	8	Do. 7½ p.c. max. .	215—225	−5	3 11 1
350,000	Stk.	Sept. 27	4	Do. 4 p.c. Deb. .	125—130	..	3 1 7
500,000	100	Feb. 13	12⅝	New River, New Shares	403—415*	+2½	3 1 8
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb. .	127—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and 5 p.c. Ord. . .	200—210	..	3 6 8
126,500	100	,,	7	South-wark and 7½ p.c. max.	190—200	..	3 10 0
489,200	Stk.	,,	5	South-wark and 5 p.c. Pref. .	155—160	..	3 2 6
1,019,585	,,	Oct. 11	4	Vauxhall 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	295—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
200,000	,,	Sept 12	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
					* Ex. div.		

contractors of last year, and that the statement was made that, in the case of glaring discrepancies, the contractors involved had met the Committee satisfactorily, and that the matter was allowed to drop. Of course, the subject has to pass the Town Council yet; but if it should be approved by them, it will be a happy ending of an incident which had possibilities of becoming exceedingly unpleasant.

Someone is endeavouring to create ill-feeling within the Gas Committee of the Corporation of Perth. It is reported that at a meeting of the Committee this week, it is understood that there were some lively passages in the discussion; that it seemed that the Gas Manager (Mr. M'Lusky) laid on the table plans and specifications prepared by himself for large additions to the works; that some members objected in rather strong terms to the specifications being held as read, as suggested by the Convener, and ultimately the specifications were allowed to lie with the Town Clerk for a week, so that the members might make themselves familiar with the plans; that there was some rather heated discussion over the proposed gas-stove exhibition—an outside firm having applied for permission to exhibit; and that several members expressed themselves as disappointed that up till now no statement of accounts had been issued to show whether the present system, as compared with the old plan, was a paying one. The sting is in the end of the paragraph. It is the change in the arrangements for the hiring out of gas fires and cookers which fixed the tone of the communications on the unfriendly side. Who is an outside firm? All firms are outside ones, so far as the Corporation of Perth are concerned. How many members will read through the specifications? Probably not one; and even if one or the whole of them did, how much would the gas undertaking benefit by the labour?

The Corporation of Falkirk have this week completed an agreement with the North British Railway Company for the construction of a railway to the Thornhill district. This agreement was not arrived at without a good deal of discussion, for there are some members who are not favourable to the erection of the Corporation gas-works at Thornhill. The adoption of the agreement makes it certain that the site will be selected. The Corporation will therefore now be in a position to go on with the erection of the new works. The branch railway is to cost about £12,000.

The Town Council of Kilsyth met this week to consider as to the proposed extension of the gas-works, upon which they have consulted Mr. A. Yuill, of Alloa. Mr. Yuill's estimate of £2300 as to the cost of the proposed works was thought to be too high, and he was requested to endeavour to modify it. But his reply was that nothing less than the whole scheme would put the works in a satisfactory condition to meet the consumption of gas, which is increasing monthly. The Council resolved to adopt Mr. Yuill's recommendations, and to proceed with the work as soon as possible.

The Gas Committee of the Glasgow Corporation have accepted the following offers: For providing the material and labour required in the construction and erection of the iron and steel work for the roofs of the workshops, exhauster-house, and meter-house of the first section of the new Provan Gas-Works, Mr. James A. Millen, £1360; 60 20-inch and 85 30-inch spigot and socket cast-iron pipes, Messrs. Laidlaw and Son; malleable iron and steel bar plates, Messrs Dempster, Moore, and Co.; bolts and rivets, Mr. Thomas Potter; and composition tubing, Messrs William Macleod and Co. The Water Committee have accepted the tender of Messrs. R. Laidlaw and Son, at a cost of £3772, for 650 tons of 4 to 16 inch cast-iron pipes.

A meeting was held at the end of last week of the ratepayers of Old Meldrum, Aberdeenshire, to consider as to the adoption of the Burghs Gas Supply Acts, and the taking over of the works of the Gas Company. Provost Wilson stated that the undertaking had been valued, as a going concern, at £909, and that the Gas Company had offered to sell for £350. The Council had agreed to offer £300. The ratepayers homologated the action of the Council, and expressed the desire to see the matter carried through, even though it should cost more.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 22.

Sulphate of Ammonia.

Although the frost has broken, the change has not as yet had its effect upon the market; the conditions being still unsuitable for agricultural operations. The market has consequently become somewhat easier in Scotland; £11 7s. 6d. per ton having been accepted f.o.b. Leith. There have been re-sellers at Liverpool at £11 7s. 6d. per ton f.o.b.; but makers throughout have been firm at £11 10s. per ton. Hull remains £11 7s. 6d. per ton, f.o.b. The forward position still hangs-fire; makers requiring £11 10s. per ton, ordinary terms, f.o.b. Leith, and Beckton terms, London, for March-June delivery, and buyers being unwilling to concede the price. May-September offers at £11 5s. per ton, but does not attract attention.

Nitrate of Soda

Is again firmer; and the spot price has been advanced to 10s. 4½d per cwt. for fine quality.

LONDON, *Feb.* 22.

Tar Products.

The market is generally quiet, with the exception of crude carbolic, which shows a decided improvement. A considerable business has been done in 60's at 1s. 10½d. March-June at outports; while 1s. 11d. has been paid f.o.b. London, for prompt shipment. Makers as a rule ask 2s. in any position; but at present consumers decline to pay this price, owing to the depression which exists in crystals. There is a little business, however, doing in 34-35's; but 39-40's are entirely neglected. Pitch remains very firm indeed, especially for prompt shipment from London; but as there is practically nothing offering, it is difficult to fix the exact value. Some important contracts have been made for September-December at outports, while there are rumours of a large business being negotiated in London over 1903; but, of course, at under existing prices. Benzol continues quiet. Business has been

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AT ORDINARY PRESSURE.

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Specially Suitable for Lighting Large Areas.

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FOR FURTHER PARTICULARS APPLY TO THE

WELSBACH INCANDESCENT GAS-LIGHT CO., Limited,

PUBLIC LIGHTING DEPARTMENT, YORK STREET, WESTMINSTER, LONDON, S.W.

done at 9d. for export from outports; but this was an exceptional transaction. In 50-90 per cent., there is nothing to report. There are buyers at 8d.; but refiners do not care to sell at this price. In solvent, there is scarcely anything doing. A few small sales have been made for home consumption, but of specially good quality. Creosote is decidedly easier all round; and although there appears to be a fairly good inquiry for export, yet the market is easier for home consumption. There is nothing doing in toluol. A considerable quantity of pure is offering at 1s. 1d.; but consumers do not take any interest in the article.

The average values obtaining during the week are: Tar, 16s. to 19s., Pitch, east coast, 37s. to 38s.; London, 39s. to 39s. 6d.; west coast, 35s. to 35s. 6d. Benzol, 90's, 9d. to 9½d.; 50's, 8d. to 8¼d. Toluol, 9d. to 9½d. Crude naphtha, 3¼d.; solvent naphtha, 10d. to 11d.; heavy naphtha, 10d. Creosote, London, 1⅛d. to 1⅝d.; North, 1d. to 1 1/16d. Heavy oils, 2d. to 2¼d. Carbolic acid, 60's, 1s. 10½d. Naphthalene, 40s. to 60s.; salts, 20s. to 25s. Anthracene, "A quality," 1¾d. to 2d. "B," 1d.

Sulphate of Ammonia.

The market is decidedly quiet, and prices are easier all round. The Gaslight and Coke Company maintain their quotation of £11 10s. for February-June. Business has, however, been done on Beckton terms at £11 6s. 3d., prompt shipment; while other London Gas Companies are willing to accept £11 7s. 6d. on their special terms. In Hull, sales have been made for March shipment at £11 7s. 6d. In Leith, there are sellers at £11 8s. 9d.; but buyers offer only £11 7s. 6d., and do not appear anxious to purchase even at this figure. In Liverpool, the demand has been very good indeed; and a large business has been done for prompt shipment. In the earlier part of the week, £11 12s. 6d. was realized; but at the moment, it is doubtful whether more than £11 10s. could be obtained. The demand for home consumption continues very good.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Although the extra pressure of demand for house-fire requirements during the past month is not likely to bring about any upward move in prices, it has a hardening influence upon the market, which more or less directly affects all descriptions of round coal. There has been a further depletion of the already small stocks held at collieries; and the serious delays in the mineral traffic over the railways is another factor, in addition to the severity of the weather, which has largely brought about a condition of things altogether unfavourable to consumers, as, owing to the non-return of waggons, temporary stoppages of pits have in many cases been necessary, notwithstanding there has been a pressure of undelivered orders on the books. The general position of trade just now is much stronger than a couple of months back, with the result that any easing down in prices is likely to be held in check until later on in the year than was at one time anticipated. For house-fire descriptions, there is a continued brisk inquiry, with prices firm at 15s. to 15s. 6d. per ton for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four feet and seconds Arley, and 11s. to 11s. 6d. for common house coal at the pit. This pressure for domestic requirements is necessarily taking off the market a good deal of the lower qualities of round coal, and restricting supplies of these for other purposes—such as iron-making and steam requirements, and for gas-making. As a consequence, prices have been very steadily maintained at recent quotations, averaging about 9s. for good qualities of steam and forge coals at the pit. The position varies somewhat with respect to engine fuel. The best sorts, so far as the Lancashire collieries are concerned, are moving off readily, and maintaining late rates, averaging 6s. 6d. for medium and 7s. for best qualities at the pit. Of the common sorts, there are plentiful supplies, owing to surplus quantities from other districts being pushed for sale in Lancashire markets, which tends to weaken prices—5s. to 5s. 6d. are about the average pit quotations for common Lancashire slacks, with slack in the Derbyshire district obtainable at from 2s. 6d. to 3s. at the pit. Shipping remains fairly good, and with but limited supplies offering at the ports, owing to the better inland prices now obtainable. From 10s. 6d. to 11s. is being got for good descriptions of steam coal delivered at the High Level, Liverpool, or Garston Docks. Coke is in steady demand.

Northern Coal Trade.

There has been rather more activity in the coal trade in the last few days, the colder weather having added to the demand for both gas and household sorts. The steam coal trade is still very quiet, and some of the collieries have not been able to work full time of late. Best Northumbrian steam coals are dull at 10s. 6d. to 10s. 9d. per ton f.o.b., unscreened steams are 8s. 3d., and steam smalls are 4s. 6d. to 4s. 9d. In the gas coal trade, there have been more contracts booked for export. The price is dependant on the rate of freight; but allowing an average rate, about 8s. 9d. per ton may be judged to be the sum left for the coal on board the steamers. There does not appear to be so much demand for occasional cargoes of gas coals; and the quotation for the best qualities of Durham gas coals seems now to be from 9s. 6d. to 10s. per ton. f.o.b. In the coke trade, values are lower. Best Durham coke for export is 17s. per ton f.o.b.; and blast furnace coke is 15s. to 15s. 6d. per ton at the Teesside furnaces. Gas coke is plentiful, though the household use seems larger. The price quoted generally is 9s. 6d. to 10s. per ton f.o.b.

Scotch Coal Trade.

There is little change in the trade. Shipping is temporarily somewhat better, but otherwise there is not much to be said, except that splint is getting more plentiful and is being pressed upon purchasers. The quotations are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. to 10s. 9d., and splint 10s. 6d. to 10s. 9d. The shipments for the week amounted to 181,640 tons—an increase of 24,734 tons upon the previous week, but a decrease of 58,635 tons upon the corresponding week of last year For the year to date, the total shipments have been 1,117,905 tons—an increase of 198,857 tons upon the same period of last year.

Aberavon New Gas-Works.—At the weekly meeting of the Gas Committee of the Aberavon Town Council held on the 17th inst., the Manager (Mr. A. Bond) submitted detailed drawings of the proposed new gas-works prepared by Messrs. Thomas Newbigging and Sons. Mr. Bond said that he had carefully gone through the plans, which had been admirably drawn up, and were complete in every detail. There were, however, one or two little alterations which he might suggest to Messrs. Newbigging. The Committee agreed to recommend the adoption of the plans by the Council, and to make the necessary application to the Local Government Board for sanction to borrow the money necessary to carry out the work—viz., £11,333. A special meeting of the Council will be held to-morrow (Wednesday) to consider the plans.

Gas Workers' Union.—According to the report of the General Secretary of the Union (Mr. W. Thorne) for the quarter ending Dec. 28, the banking account was increased by £1095, and the membership was maintained. The total receipts were £5872, of which a sum of £1151 was spent in dispute pay—the bulk of it going to men employed in iron and steel works, builders' labourers, and pit-top men. The Leeds, Birmingham, Barnsley, and South Wales districts were unsettled; and so was Bristol, with the strike of tramway men. The abortive strike of builders' labourers at Swansea was slightly compensated for by the success of the gas workers at Merthyr and the gaining of the eight-hour shift for the sulphate men, 1s. 6d. per week for all labourers, and better working conditions generally, at the Swansea Gas-Works. The expenses attending the South Wales troubles amounted to £210. Mr. Thorne trusts there will be fewer strikes and lock-outs this quarter; and he enjoins all the members to strive to maintain the new working conditions, and not press for any fresh alterations, "because of the very gloomy outlook of industry."

Sales of Shares.—At Sunderland, last Thursday, Mr. Atkinson Gibson offered for sale £20,000 (nominal) of the new stock (maximum dividend 5 per cent.) authorized to be created and issued under the Sunderland and South Shields Water Company's Act of 1891. There was spirited bidding for the shares; and in a short time the whole had been bought up. The prices realized ranged from £125 to £126 10s. per cent. On Thursday, Mr. T. Murray sold by auction, at Durham, 24 fully-paid £10 shares of the first and third issues of additional capital of the City of Durham Gas Company, carrying interest at the rate of 7 per cent.; the prices realized being £12 10s. to £12 12s. 6d. each. Sixteen fully-paid £5 ordinary shares in the Consett Water-Works Company, carrying interest at the rate of 6½ per cent., were sold at £8 5s. each; and five fully-paid £25 shares in the Weardale and Shildon Water Company fetched £38 12s. apiece. At the Mart, Tokenhouse Yard, last Wednesday, Messrs. Fox and Bousfield obtained £52,485 for rather more than half a King's share in the New River Company, which was offered in 67 lots. On Wednesday, Mr. H. J. Hetherington sold locally some shares in the Windsor Royal Gas Company, at prices ranging from £28 to £28 10s. per £20 "N" share; "O" shares of the same face value fetching from £40 15s. to £41 5s. each. Six £10 fully-paid shares in the Slough Gas Company realized £13 16s. apiece.

Bingley Gas Supply.—At the last monthly meeting of the Bingley Urban District Council, the Clerk was instructed to write to the Bradford Corporation asking on what terms they would be prepared to transfer the Willesden portion of the undertaking of the Clayton, Thornton, and Allerton Gas Company, which they are about to acquire, to the Council. The question of the erection of new gas-works for Bingley was deferred for a month.

Reductions in Price.—In their half-yearly report, the Directors of the Croydon Gas Company state that the price of gas will be reduced by 2d. per 1000 cubic feet from Lady-day next. The Aldershot Gas and Water Company have reduced the price of gas in their district by 2d. per 1000 cubic feet, as from the reading of the meters for the quarter ended Dec. 31. The Melrose Gas Company, Limited, have reduced the price of gas from 5s. 5d. to 5s. per 1000 cubic feet.

Gas Poisoning Cases.—An accident which came very near to having fatal consequences occurred in Liverpool last Thursday. Mr. John Moore, of the Laurel Mount Dairy, employs three assistants, who sleep in one room on the same floor as the proprietor; and on Wednesday two of them retired to rest, leaving the gas lighted for the third. Very early next morning Mr. Moore awoke and heard groans, which he found proceeded from the bedroom occupied by the men. When rescued, the three men were quite insensible; but medical assistance was summoned, and, after long efforts, consciousness was happily restored. At Wigton, last Saturday week, three persons were affected (though fortunately not seriously) by an escape of gas from a 3-inch pipe, which had been fractured. The gas penetrated underground a distance of 26 feet, into the two cottages occupied by the people affected.

Protection of Trade Union Funds and the Law of Picketing.—The "Daily Chronicle" understands that the Parliamentary Committee of the Trade Union Congress have received the support of fully thirty Members of Parliament to the clause which it is proposed to introduce, in the form of an amending Bill, in regard to the law of picketing, and which, if sanctioned by Parliament, will restore the rights of picketing, which have been exercised by Trade Unions for thirty years. The proposed clause provides that to persuade peacefully a person not to work during a strike shall not be deemed "watching or besetting" within the meaning of section 7 of the Conspiracy and Protection of Property Act, 1875. The Trade Unions of the country are receiving a report of the proposals for the protection of funds which have been framed as the result of a consultation with Mr. H. H. Asquith, M.P. Some details of the proposals have been published. They indicate or suggest an alteration in the rules so as to separate the funds, and set apart those destined for sick and benefit purposes—the setting apart, however, being supplemented by other measures. The principal one of these is that every Trade Union should have a subsidiary company registered under the Companies Acts, 1862 and 1890. This company, it was pointed out, would look after the sick and benefit business; and if a Trade Union ran short of funds, they would be in a position to make it a grant or loan. It would be a company limited by guarantee.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

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BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. **SMETHWICK, 500,000 Cub. Ft.** **PERNAMBUCO (Brazil), 125,000 Cub. Ft.**
MALTON, 150,000 Cub. Ft. **GRAVESEND, 300,000 Cub. Ft.** **DULUTH, MINN. (2nd Cont.) 300,000 Cub. Ft.**

East London Water Company's Assessments.—At the meeting of the Stepney Borough Council last Wednesday, the Finance Committee reported that the appeal of the East London Water-Works Company against the assessments of their property in several parishes of the borough had been decided at the Assessment Sessions. For Ratcliff, the assessment had been increased from £529 to £531; for Limehouse, it had been reduced from £2320 to £1043; for Mile End Old Town, from £4150 to £3775; and for St. George's-in-the-East, from £1369 to £1272—the total decrease made in the assessments being £1747.

The Price of Gas North of the Thames.—At the meeting of the Court of Common Council last Thursday, a letter was received from the London County Council relative to the charge made by the Gas-light and Coke Company to their consumers north of the Thames. It was stated therein that, in order to ascertain the views of the local authorities concerned, the Council has resolved to convene a conference of representatives of the Corporation of the City of London and the Metropolitan Borough Councils in the district north of the Thames supplied by the Company, to consider the present high price charged for gas, and the course to be adopted to obtain a reduction; and that it was proposed to hold the conference at the County Hall, Spring Gardens, at three o'clock on Friday, the 7th prox.

Faversham Corporation and the Gas Company.—It was resolved, on the proposition of Mr. Knowles, at a meeting of the Faversham Corporation last month, that the Gas Company should be asked if they would reduce the price of gas from 3s. 6d. to 3s. per 1000 cubic feet, and whether they intended to make any abatement for the inferior light supplied during the quarter ending Sept. 30 last, as was suggested they might do by the Magistrates who heard the case between the Corporation and the Company at the November Petty Sessions. The Company's reply to the Town Clerk's letter was read at a meeting of the Corporation on Tuesday last. The Directors stated that they could not see their way to meet either of the points raised in the way suggested; and they failed to understand what right the Council had to take up the position the resolution implied.

In the "JOURNAL" for the 11th inst. we called attention to the artistic collection of gas-fittings to be found in the last catalogue (No. 19) issued by Messrs. Evered and Co., Limited, of Drury Lane. We have since received their catalogue of water-fittings for the present year (No. W14), which is in every way a worthy companion of the other work. Of course, the contents do not afford the same scope for artistic display; but where there is an opportunity for it—as, for instance, in closet and lavatory fittings—it has not been neglected. When it is mentioned that the book contains 232 large quarto pages, an idea may be formed of the number and variety of the articles illustrated, some of which may be seen in action in the large show-rooms of the firm. Altogether, Messrs. Evered and Co. have produced a very comprehensive catalogue, which should be useful alike to the water engineer, the sanitarian, and the ordinary plumber; and, moreover, it is an excellent specimen of "black and white" printing.

Messrs. Biggs, Wall, and Co. have received orders for the supply of their power charging machines to Epsom, and for a manual charging machine at Harlow.

The Trustees of the late Dr. Andrew Stewart, of A. & J. Stewart and Menzies, Limited, tube makers, of Glasgow, are to erect an Institute in Coatdyke (to be held by the Town Council of Coatbridge in all time coming) to be used for public baths and reading and recreation rooms. This is to be in lieu of a legacy of £500 which Dr. Stewart left to the burgh of Coatbridge.

A disastrous fire broke out last Wednesday night at the chemical works of Messrs. Sadler and Co., at Middlesbrough. A large shed containing naphtha and other oils was almost entirely destroyed. Adjoining sheds, in which a large quantity of inflammable chemicals were stored, were only saved by the wind carrying the flames in the opposite direction. The damage done was considerable.

The business and property of the Motor and Automatic Liquid Elevator Company, Limited (the owners of the Keith patent gas compressors and burners for high-pressure gas lighting), have been acquired by Messrs. James Keith and Blackman Company, Limited, the first-named Company's General Agents. Mr. James Keith is the Managing Director of the combined Company; the entire staff continues as before; and the business will be carried on at the same addresses.

According to the "Moniteur Industriel," Messrs. Oberfelt and Co., of Berlin, have placed on the market a new burner with special mantle. Without employing high pressure, this burner is stated to have a power of 1000 candles per cubic metre (35·3 cubic feet). The consumption of gas is about 12·3 cubic feet per hour, and the illuminating power consequently 350 candles. The mantle is styled the "Preciosa," and is of large size. The burner has an ordinary chimney.

At a special meeting of the Cockermouth District Council last Wednesday, the resignation of Mr. Harold Baker, the Gas Manager, who, as mentioned elsewhere, is leaving to take an appointment at High Wycombe, was accepted, and it was decided to advertise for a successor. It will be seen by an announcement which appears elsewhere that this has been done. The applications will be considered at a special meeting to be held next Saturday. The new Manager will be allowed to take a pupil.

An instance of the value of gas exhibitions has reached us from Wokingham. Last year the Gas Committee of the Corporation arranged with Messrs. Fletcher, Russell, and Co., Limited, to have an exhibition of their gas-ranges and domestic gas appliances, with cookery lectures twice daily by Miss Helen Edden, and demonstrations with prepayment ranges. With the co-operation of the Secretary and Manager of the Gas Department (Mr. A. G. Bates), 120 cookers and "slot" installations were placed. This was considered to be so good that the exhibition is to be repeated in the Town Hall from the 4th to the 7th prox., with the valuable assistance of the above-named lady. It will be inaugurated by the Mayor (Mr. E. C. Hughes); and it may be confidently hoped that similar good results to those obtained last year will be achieved.

C. & W. WALKER, Ltd.

Midland Iron-Works,

DONNINGTON, Near NEWPORT, SHROPSHIRE.

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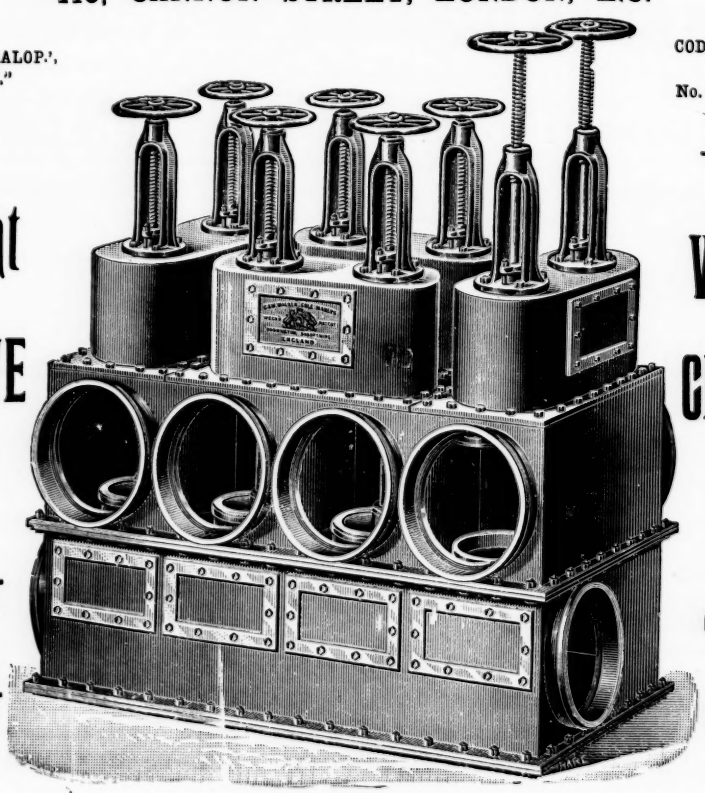

Weck's Patent CENTRE-VALVE

PERFECTLY TIGHT UNDER EVERY EXTREME OF HEAT OR COLD.

THE ONLY ABSOLUTELY RELIABLE CENTRE-VALVE IN THE MARKET.

Messrs. R. Dempster and Sons, Limited, of Elland, who erected the installation of inclined retorts at the Chesterfield Gas-Works in 1898, have received the order for resetting the retorts in three out of the six arches. The whole of the retorts have gone through four winters, and the remaining three arches are expected to go through next winter.

According to the correspondent of the "Petit Journal" at Marseilles, a steamer from Cannes has been wrecked there. The vessel was thrown on the rocks in a gale, and broke up. At the same time, a tremendous explosion of acetylene gas occurred; the captain and one passenger being killed and two sailors injured. The rest of those on board were rescued.

Messrs. Kirkham, Hulett, and Chandler, Limited, have received an order from the Gloucester Gas Company for a patent standard condenser having a capacity of one million cubic feet of gas per twenty-four hours.

An exciting scene was witnessed in the Strand on Monday morning last week. Shortly after ten o'clock, fire broke out in the electric wire subway opposite the Adelphi Theatre. Dense volumes of smoke rolled out of the manhole, and traffic was immediately stopped. Water was poured down the hole and quantities of sand were thrown in, and the flames were quickly subdued. The fire was caused by the fusion of two wires.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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Telegrams: "GASKING, LONDON." Telephone: Holborn 121.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

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"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

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Offices: Commercial Buildings, LEEDS. Correspondence invited.

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Twice as Rich as Bog Ore.
Gives no Back Pressure.
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Can be Exchanged for Spent Oxide.

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MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

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BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.

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VICTORIA PAINT WORKS,
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Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

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HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.

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CHEMIST and Assayer (M.A. Cam- bridge, Royal College of Science, A.I.C., F.C.S.), seeks appointment as a PRACTICAL CHEMIST in one of the Chemical Industries either as Assistant or Research Chemist. Has had considerable experience, including Gas and Water Analysis. Disengaged shortly.

Address "CHEMIST," care of G. W. Byrne, Esq., Solicitor, 14, Bell Yard, TEMPLE BAR, W.C.

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J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

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HIGHEST-CLASS Cycles.—"Humbers," "Premiers," "Swifts," "Court Royals," "Centaurs," and all best makes on Special Terms to Gas and Water Officials.

Write precise Requirements to MANAGER, Imperial Cycle Supply Company, COVENTRY.

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BLENHEIM HOUSE, 23, Lower Mall, HAMMERSMITH.
Telegrams: "Gasoso."
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H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

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Largest Practice and most Up-to-Date Works in Britain.

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GENTLEMAN, who is a good ACCOUNTANT and thoroughly understands SECRETARIAL duties and general work of Gas Office, possessing full knowledge of GAS STOVE and FIRE DEPARTMENT, seeks re-engagement.

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YOUNG Man (age 24) requires Situation to ASSIST MANAGER of Gas-Works. He has a good knowledge of Carbonizing, Carburetted Water Gas, making Tests for Impurities and Illuminating Power. Can assist in keeping Accounts, preparing Drawings, &c.

Apply to G., 1A, Church Walk, WANDSWORTH, S.W.

WANTED, a steady young Man as FOREMAN LAMPLIGHTER. Must have had experience with Incandescent Burners.

Apply, stating Age and Experience, to the ENGINEER and MANAGER, Gas-Works, Ryde, ISLE OF WIGHT.

COAL GAS TAR wanted.

State Quantity to offer for Prompt and Forward Delivery.

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WANTED, a Gasholder Erector.

Apply, by letter, stating Experience and Age, with recent Testimonials, to No. 3807, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Draughtsman, with experience in Gas-Works Plant, and competent to act as Clerk of Works during construction of new Works.

Apply, by letter, giving Experience and References, and stating Terms required, to No. 3823, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Carbonizing Foreman in a 120 Million Works. He must be a good Carbonizer, thoroughly understand Regenerator Firing, the general routine of a Gas-Works, and willing to make himself generally useful.

Apply, by letter, with three Testimonials, stating Age and Wages required, to No. 3828, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Country Gas-Works, a COMPETENT MAN to undertake occasional Gas-Fitting, Stove Repairing, Meter Testing (with External Repairs), and to make himself generally useful.

Apply by letter, stating Wages required, and enclosing *copies* of Testimonials, to No. 3824, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Horley District Gas Company, a RESIDENT SECRETARY and COLLECTOR. Commencing Salary £100 per annum. Age not to exceed 30.

Applications to be made, in writing, addressed to the CHAIRMAN, Horley District Gas Company, 147, Dashwood House, New Broad Street, E.C., on or before Thursday, the 27th inst., Twelve o'clock Noon.

SHOTLEY BRIDGE AND CONSETT DISTRICT GAS COMPANY.

GAS-FITTER.—Wanted, by the above Company, a steady Man as GAS-FITTER. One accustomed to Mains and Services, Meters, and Gas-Stoves.

Apply, stating Experience and Wages, to
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Shotley Bridge.

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FITTER.

THE Ashton-in-Makerfield Urban District Council invite applications for a FITTER. One used to Gas-Works. The appointment in the first instance will be temporary.

Applications, stating Age, Experience, and Salary required, to be forwarded to the undersigned not later than the 1st of March next.

By order,
ALBERT SYKES,
Clerk.
Council Offices, Ashton-in-Makerfield,
Feb. 13, 1902.

The SUBSCRIPTION LIST will OPEN on MONDAY, the 24th day of February, 1902, and CLOSE on or before THURSDAY, the 27th day of February, 1902.

A SOUND WELL-ESTABLISHED INDUSTRIAL UNDERTAKING.

Company formed to amalgamate: (1) The well-known and old-established firm of JONAS DRAKE AND SON, of Ovenden, Halifax, and (2) THE GAS ENGINEERING BRANCH OF THE LEEDS FIRECLAY COMPANY, LIMITED.

Well-secured 4½ per cent. Debentures and 6 per cent. Preference Shares offered for public subscription.

The Vendors show their confidence in the Prospects of the Company by taking the whole of the Ordinary Shares.

No Dividend exceeding 8 per cent. per annum can be paid on the Ordinary Shares until the Reserve Fund provided for by the Articles of Association amounts to £25,000.

Provision for continuity of management.

No underwriting commission on the issue.

This Prospectus has been filed with the Registrar of Joint-Stock Companies, in accordance with the Companies Act, 1900.

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DRAKES LIMITED,

GAS AND CARBONISING ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

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London Office: 34, VICTORIA STREET, S.W.

(Incorporated under the Companies Acts, 1862 to 1900, as a Company, Limited by Shares.)

SHARE CAPITAL - - - £90,000,

Divided as follows:—

40,000 Cumulative 6 per cent. Preference Shares of £1 each	**£40,000**
50,000 Ordinary Shares of £1 each	**£50,000**
	£90,000

The Cumulative Preference Shares will be entitled to a Cumulative Preferential Dividend of 6 per cent. out of the profits of the Company on the Capital for the time being paid up thereon, and rank both as to Dividend and Capital in priority to the Ordinary Shares. They are repayable at par in the event of the reconstruction or winding up of the Company.

Of the above mentioned Capital, the Vendors take in part payment of the purchase money £50,000 in Ordinary Shares of £1 each.

First Mortgage Four-and-a-Half per Cent. Debentures (secured by a Debenture Trust Deed and First Mortgage of the Company's Freehold Property and the Fixed Plant thereon, and by a Floating Charge on all the assets and undertakings of the Company, including its Uncalled Capital for the time being)	£25,000
40,000 Six per Cent. Cumulative Preference Shares of £1 each	40,000
	£65,000

NOTE.—By the above-mentioned Debenture Trust Deed, a power is reserved to the Company to issue further Debentures ranking in point of security *pari passu* with this present issue, provided that the total amount of the Debenture issue for the time being does not exceed four-fifths of the total value of the property for the time being specifically mortgaged by such deed.

Payable as follows:

On the Debentures.	On the Cumulative Preference Shares.
10 per cent. on Application.	2s. 6d. per Share on Application.
The Balance on Allotment.	7s. 6d. per Share on Allotment.
	10s. 0d. per Share on the 7th day of April, 1902.
	£1

The first payment of Interest on the Debentures will be made on 30th June, 1902, calculated at the rate of 4½ per cent. per annum on the instalments from the dates of the several payments, and thereafter the Interest will be paid half-yearly on the 30th June and 31st December in each year.

These Debentures will be redeemable at the Company's option at par at any time after 30th June, 1909, on six months' notice, or at any time in the event of a voluntary winding up for the purpose of reconstruction, amalgamation, or otherwise, or at a premium of £5 per cent. between 1st July, 1907, and 30th June, 1909.

TRUSTEES FOR DEBENTURE HOLDERS.

ARTHUR CURRER BRIGGS, J.P., Roundhay, Leeds (Chairman. Henry Briggs, Son, and Co., Ltd.).

JOHN ARMITAGE DRAKE, Thornleigh, Halifax, Gas Engineer.

DIRECTORS.

JOHN ARMITAGE DRAKE, Thornleigh, Halifax (Gas Engineer) (Chairman).

WILLIAM INGHAM, Harlow Heath, Harrogate (Director of the Leeds Fireclay Company, Ltd.).

JOHN SAMUEL MARSLAND, M.I.Mech.E., Field House, Ovenden, Halifax, Gas Engineer.

WILLIAM ARMITAGE DRAKE, Thornleigh, Halifax, Gas Engineer.

BANKERS.—THE HALIFAX JOINT-STOCK BANKING CO., LTD., and Branches; LLOYDS BANK, Ltd., and Branches.

SOLICITORS.—JUBB, BOOTH, AND HELLIWELL, 7, Harrison Road, Halifax; SCATCHERD, HOPKINS, AND MIDDLEBROOKS, Prudential Buildings, Park Row, Leeds, and at Morley.

BROKERS.—POTTER AND CO., Park Row, Leeds; CARTER AND WILKINSON, Halifax; F. W. BENTLEY AND CO., Huddersfield.

AUDITORS.—MITCHELL AND COULDWELL, Chartered Accountants, Ward's End, Halifax.

SECRETARY AND REGISTERED OFFICES.—ALBERT BARRETT, F.S.A.A. (Sec. Leeds Fireclay Company, Ltd.), Ovenden, Halifax.

ABRIDGED PROSPECTUS.

The Company has been formed to amalgamate, carry on, and extend: (1) The Business of Gas and Carbonizing Engineers, Ironfounders, Furnace and Retort Builders, and Contractors, carried on by Messrs. Jonas Drake and Son at their freehold works at Ovenden, Halifax, and (2) The Gas Engineering Branch of the Leeds Fireclay Company, Limited, carried on at their freehold works at Wortley, Leeds, and for any other purposes connected with the manufacture of plant and machinery for Gas, Chemical, and Residual Works, &c.

The business of Messrs. Jonas Drake and Son was established upwards of 40 years ago by the late Mr. Jonas Drake, and has from that time been successively carried on by him and Mr. John Armitage Drake, subsequently by Mr. John Armitage Drake, and latterly by Messrs. John Armitage Drake, William Armitage Drake, and John Samuel Marsland. The business has been steadily progressive. The Company will acquire many valuable patents and processes connected with the business, including the patent of the well-known and popular Patent Tube Furnace supplied by the firm.

The Leeds Fireclay Company, Limited, is well known for its productions of Gas Retorts, Fire Bricks, and other Fireclay goods used in connection with gas-works, which have acquired a very high reputation. In the years 1899 and 1900, the Directors decided to establish, as a separate branch, the Gas Engineering business, to enable them to undertake contracts for the erection of complete gas plants, &c.

The prospects of Drakes, Limited, are believed to be excellent. The Company, by reason of the previous experience of the Directors, will be specialists in Gaseous Firing, and in the erection of Retort-Benches, Regenerator Furnaces, and Retorts, and the businesses to be acquired by the new Company have already a large and valuable connection in respect of this kind of work throughout the country. The new Company will also be in a position to supply Elevating and Conveying Machinery in connection with inclined retorts and coal and coke handling plant, and many other kinds of machinery and appliances required in connection with gas-works.

Arrangements are being made for an Agency in the United States for the further development of the business, especially in connection with Inclined Retorts and General Carbonizing Plant.

Of the said purchase price £80,000 will be paid to Messrs. Jonas Drake and Son; as to £29,750 in Ordinary Shares, and as to £50,250 in cash, or Preference Shares or Debentures, at the option of the Company; £25,000 will be paid to the Leeds Fireclay Company, Limited, as to £18,750 in Ordinary Shares, and as to £6,250 in cash, Preference Shares, or Debentures, at the option of the Company. Messrs. John Armitage Drake, William Armitage Drake, and John Samuel Marsland have respectively signed the Memorandum of Association and Articles for 500 Ordinary Shares each.

The Vendors of Jonas Drake and Son will hand over the business as from the 1st November, 1901, guaranteeing book debts, less liabilities, as stated; The Leeds Fireclay Company will hand over the Engineering Works as from the same date, free of all liabilities and retaining the book debts as on 1st November, 1901.

Interest at 4½ per cent. per annum on the cash consideration will be payable from 1st November, 1901, until the actual completion of the purchase.

The amount of the present issue will leave a sum of £10,000 available for costs payable by the Company, and for working capital and general purposes, in addition to the balance of £20,000 of book debts, and is considered ample for the requirements of the Company.

Applications for Preference Shares or Debentures must be made on the forms enclosed with the prospectus, and forwarded with deposit to the Bankers, the Halifax Joint-Stock Banking Company, Limited, of Princess Street, Halifax, and its Branches, or Lloyds Bank, Limited, Park Row, Leeds, or its Branches, on or before the 27th day of February, 1902.

When the Debentures and Shares allotted to any applicant are less than the amount and number applied for, the surplus deposit will be credited in reduction of the amounts payable on allotment.

Failure to pay any instalment when due will render the previous payments liable to be forfeited.

In cases where no allotment is made, the deposit will be returned in full.

Applications will be made in due course for a quotation for the Debentures and Preference Shares on the Leeds Stock Exchange.

Dated 20th February, 1902.